AVIATION WEEK
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JULY 26, 1948

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AVIATION WEEK

Vol. 49 No. 4 — July 26, 1948

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NEWS SIDELIGHTS

Election Prospects

The two top ranking Democrats on Senate Interstate and Foreign Commerce Committee, which handles all civil aviation matters, face stiff primary election fights and are not given odds to win. They are Colorado's Sen. Ed Johnson and Tennessee's Sen. Tom Stewart.

Johnson is pitted against Eugene Cervi, former state Democratic chairman, in Colorado's September 7 primary. Stewart's chances in the August 5 primary in Tennessee are in hazard because of the bolting of "Dixiecrats" from the Democratic ranks in the state. Johnson is now chairman of interstate's aviation subcommittee.

Defeat of Johnson and Stewart would mean that Arizona's Sen. Ernest McFarland would become top ranking Democrat on the committee.

New Senator

Maine's Rep. Margaret Chase Smith, the Republican nominee who appears slated for election to the Senate in Maine's September 13 election, is best known in aviation circles for her lambasts on the House floor against the Civil Aeronautics Board.

She has repeatedly charged that the Board favors the interests of scheduled airlines and suffocates the development of independent operators. She authored a resolution calling for an investigation of the matter which died in the Rules Committee. The congresswoman is well-informed and has been active in naval aviation affairs as a member of the old house Naval Affairs Committee and later as a member of the Armed Services Committee.

She was opposed in the primary by Maine's GOP Sen. Owen Brewster, a well-known figure in aviation circles. Brewster supported the state's Gov. Horace Hildreth for the GOP nomination.

Constitutional Quirks

Apprehension that California's Rep. Carl Hinshaw could not be considered for Secretary for Air in a Republican administration under a constitutional provision appears to be unwarranted. The provision states that "no Senator or Representative shall, during the time for which he was elected, be appointed to any civil office ... which shall have been created ... during such time."

Hinshaw is serving in the 80th Congress which enacted the 1947 Unification Act, creating the posts of Secretary for Defense and Secretary for Air. Experts report that the constitutional provision means that the congressman could not be appointed from the 80th Congress to serve as defense or air secretary, but it does not mean that he could not be appointed from a new term of service, in the 81st Congress, to fill either post.

Appointment of Pennsylvania's Sen. Edward Martin as defense secretary in a GOP administration—being widely discussed—does, however, appear to be "out" under the provision. Martin was elected for a six-year term in November, 1946, as a member of Congress when the Unification Act was passed, and, therefore, experts report, is not eligible to fill posts created by that act during the remainder of his term of service.

National Strike

National Airlines officials are incensed at the free-swinging criticism of management contained in the Presidential Emergency Fact-Finding Board's report on the carrier's disputes with the Air Line Pilots Association and with the International Association of Machinists.

Authorities on labor relations agree that the language used by the panel was unusually strong, especially the statement that National had evidenced "an immaturity and lack of responsibility inconsistent with the duties imposed by Congress on interstate carriers." This assertion, plus the finding that NAL had violated the Railway Labor Act, can be used effectively by ALPA in its appeal for a CAB order directing the airline to comply with the labor act or suffer revocation of its certificate.

Oral argument on the case is scheduled this week. Meanwhile, ALPA was prepared to invoke the full support of the American Federation of Labor in an attempt to tie up National's operations completely if the company failed to accept the Presidential Emergency Board's recommendations by the end of last week.

Arrested Development

Two advanced personal plane designs remain in a state of arrested development at Engineering & Research Corp., Riverdale, Md. Fred E. Weick, inventor of the two-control Ercoupe, designed them long before he left ERCO to become a professor at Texas A & M College.

Prototypes for both designs, the four-place 165 hp. Ercoupe Four and the five-place twin-engine Ercoach, have been near completion for more than a year, but work on them has been stopped due to the declining personal plane market. Both planes and particularly the Ercoach are sufficiently advanced in design that they could be tough competitors in any revival of the personal plane market in the next several years. But Sanders Aviation, world Ercoupe distributor, and the manufacturing company see little prospect for completing the developments and for production of the planes in the early future.

Transport Problem

If the Russian blockade on Berlin continues, watch for the Air Force to begin using U. S. airline planes and crews to backstop the airlift into the blockaded city. USAF is already scraping the barrel on the number of transports available for the operation without curtailing its other operations while some airlines now have surplus C-54s. Best bet for air drops on Berlin are Fairchild C-82 Packets already specially equipped for parachuting heavy equipment and supplies. Most of the 200 Packets delivered to the USAF are tied up for the summer in troop carrier training maneuvers.

Training Revolution

Fourth Fighter Wing, Strategic Air Command, Andrews Air Force Base, Md., has recently caused the Air Force to do some soul-searching in its highly-touted scientific methods of compounding pilot training syllabi.

The Fourth has repeatedly placed AT-6 pilots right into the seat of a F-80 fighter and watched the neophytes handle the jet fighter like a veteran in a few hours practice during recent weeks.

Air Training Command is proceeding cautiously with its Fall syllabus which will place AT-6-trained pilots in TF-80C training after 170 hours.

But this advanced system was produced only after exhaustive scientific study, the Fourth just tried it as a lark, and saved the taxpayer several thousand dollars on each Air Force cadet.

NEWS DIGEST

DOMESTIC

Pan American Airways has signed an arbitration agreement with its CIO navigators' union thereby averting a strike which had been set for last week.

National Airlines and International Association of Machinists have resumed contract negotiations following recommendations of the President's Emergency Fact Finding Board. Picketing in the six-month strike of clerical and mechanical workers has ended.

Wright Brothers' Kitty Hawk plane, now in the Science Museum near London, has been appraised at $1 for taxation purposes at Dayton, as a preliminary step toward its return to this country and placement in the National Museum at Washington.

FINANCIAL

Beech Aircraft Corp reported profit for nine months ended June 30 of $868,800 or $2.17 per share on company's 400,000 shares of $1 par capital stock outstanding. Sales totaled $18,184,628.

General Electric Co. showed profit of $54,602,339 for the first six months of 1948 or 28 percent more than net income for corresponding period last year. Consolidated net sales were $772,761,792.

FOREIGN

World Aviation Annual (1948) a 544-page reference volume has been published jointly by Aviation Research Institute, Washington, and the James Cabot Professorship of Air Transportation, Norwich University. Editorial staff is headed by Dr. J. Parker Van Zandt, editor, John C. McClelland, executive editor, and Fred Hamlin, managing editor.

More than 20 new airlines have been opened in Russia in the last two months, TASS, Russian news agency, reports. Moscow is said to be connected by air with capitals of all Russian republics and major industrial centers.

David Graham of Australia Department of Civil Aviation, has been appointed Australia's civil air attache in Washington, D. C., succeeding C. J. Smart.

Three Surplus B-17s are reported to have become the backbone of Israel's air force in the continuing war with the Arabs. A fourth B-17 which landed at Nova Scotia and filed a flight plan to return to New York, instead flew to the Azores, presumably on its way to join the Israeli force.

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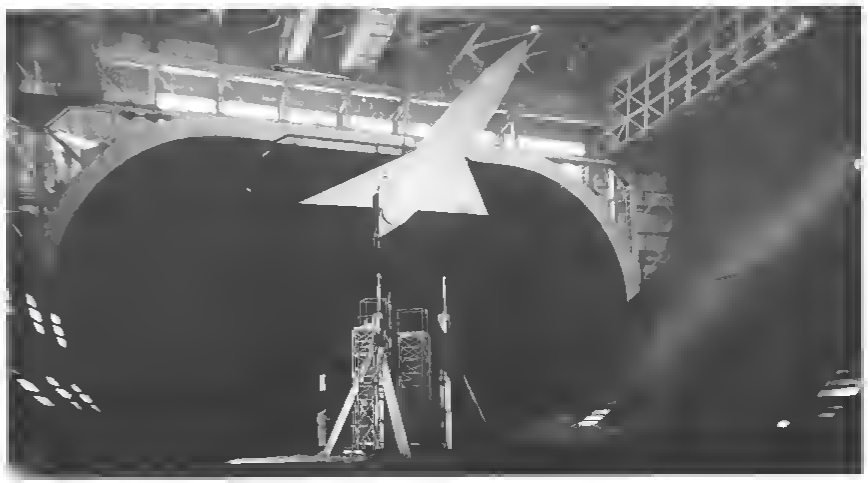


WORLD'S LARGEST WIND TUNNEL and latest wing plan for jet and rocket powered supersonic interceptors are shown here.

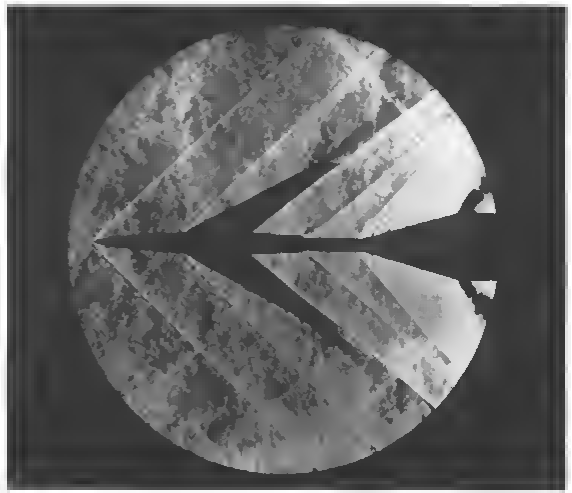
NACA Shows Ames Laboratory Progress

New data is offered on the supersonic roles of swept, straight wings.

By Robert Hotz

Moffett Field, Calif.—Significant advances in charting the details of supersonic aerodynamics plus new transonic research techniques were revealed in the second biennial inspection of the Ames Memorial Laboratory of the National Advisory Committee for Aeronautics. More than 800 aircraft manufacturing executives and engineers plus top ranking Air Force and Naval Aviation brass attended the two-day session.

A more distinct detailed picture of the aerodynamic phenomena encountered in the range between Mach .8 and Mach 2.0 has emerged as a result of the last year's NACA research in this previously undefined area. Most important advance of the year—the first piloted supersonic flights by USAF and NACA test pilots in the Bell X-1 rocket powered research plane—was significantly



omitted from any of the discussions

▶ **Sweep vs Straight**—Perhaps the most interesting delineation offered by the NACA researchers was the assignment of proper places to swept back and straight wings in the supersonic picture.

The supersonic flights of the X-1 proved it is possible to achieve these speeds with extremely thin, straight wings. But wind tunnel research and flight test data indicate that the swept back wing still offers the most promising possibilities in the transonic range between Mach .08 and about Mach 1.8.

In this area the sweep back of the wing delays the formation of shock waves across the wing allowing a subsonic airflow over the wing while the aircraft is travelling at supersonic speeds (lower photo, p. 11).

At about Mach 1.8 the shock waves catch up with the swept back wing and send drag soaring beyond the capabilities of any power plants that are likely to be available in the foreseeable future.

A straight wing encounters shock waves below Mach 1.0. Above Mach 1.8 the straight wing becomes more efficient than the swept back wing.

Tactical implications of this:

• Relatively long range, heavy load carrying planes such as bomber and transports operating in low supersonic ranges will feature swept back wings.

• Ultra-sonic small interceptor types will have configurations much like the Bell X-1 with straight wings but requiring tremendous power which will probably be available only for extremely short periods.

▶ **New Technique**—New supersonic research technique involves transfer of the wind tunnel device of Schlieren photographs of shock waves to similar photos made in actual flight tests on high speed aircraft. This differs from previous "shadowgraph" photography of shock waves in flight in strong sunlight because it gives a detailed view in a vertical plane through the shock wave and boundary layer air. Shadowgraph photography merely showed the shock wave horizontally along the wing.

The Schlieren apparatus is attached to an F-51 wing in shock proof mounts. A beam of parallel light rays is projected through a narrow airflow across the wing. Density variations refract the light and register the shock wave and other air density changes on the camera film.

▶ **Difficulties Overcome**—Principal difficulties encountered in successful application of this wind tunnel technique to flight tests were interference of direct and reflected sunlight and plane vibration.

Sunlight interference was overcome by use of a light beam of single frequency paired with a camera filter that admits light only of the frequency of the projecting beam. Thus excludes stray light of other frequencies from registering on the film. Use of shock mounts eliminated vibration that disturbed the optical system.

Precision flying is required from the pilot in this type of flight test to keep an oscillating shock wave on his wing within the three inch field of the Schlieren apparatus.

Another critical supersonic problem requiring early solution is safe pilot ejection at extremely high speeds. NACA has been testing jettisonable noses which carry the pilot down into subsonic speeds before using a parachute.

Tendency of these capsules to tumble end over end after parting from the plane produces loads up to 20 Gs, considerably more than a pilot can stand.

Need for special stabilizing devices to prevent tumbling, avoid ramming of the rest of the plane; and slowing the capsule to speeds where a chute can be used safely is indicated. Wind tunnel tests have resulted in frequent collisions between the ejection capsule and planes that are damaged or out of control.

Among the other field of supersonic research discussed:

▶ **Heat Transfer** — Dissipation of tremendous heat generated by air friction at ultrasonic speeds looms as major problem. Indications are that refrigeration systems will be required for aircraft operating at supersonic speeds as high as 100,000 ft. where extremely cold outside air temperatures prevail. Differences of as high as 2500 degrees Fahrenheit may be encountered between the front and rear portions of bodies travelling at 24,000 mph at 75 miles altitude. Research has also revealed that slow dissipation of heat by aircraft structure creates thermal stresses during prolonged dives.

▶ **Boundary Layer Control** — Emphasis has shifted from trailing edge boundary layer control devices to a leading edge suction slot or porous strips as a means of increasing lift and improving stall characteristics of extremely thin airfoils required for supersonic flight. Power requirements to produce the suction continue to be large and will require considerable reduction before this method becomes practicable.

▶ **Propellers**—Research is continuing on propellers up to supersonic speeds with sweepback and thinner blades the two most promising forms under considerations. Ames's 40 x 80 ft. wind tunnel is being used to test influence of fuselage and wing interference of twin engine aircraft on propeller efficiency.

Those attending the inspection paused to pay a minute's silent tribute to the memory of Dr. George W. Lewis, former director of NACA research for 25 years, whose death was announced at the inspection.

Air Legislation

The special session of Congress may act on left-over measures.

Congress is expected to complete action during the special session convening today on important aviation legislation which missed passage in the last minute rush for adjournment a month ago.

The measures, all of which have overwhelming support on Capitol Hill, are:

▶ **Prototype Development**—Legislation authorizing the government to finance research and development costs on commercial cargo and transport planes was blocked from unanimous-consent passage in the closing hours of the last session of the Senate by Sen. John Williams (R., Del.) and Sen. Claude Pepper (D., Fla.). Recommended by the Congressional Aviation Policy Board and supported by all government agencies concerned, it already has passed the House and has the backing of a majority in the Senate. Sen. Owen Brewster (R., Me.) plans to steer it through during the special session.

The program would be directed by a five-member government board of representatives of the Air Force, Navy, Civil Aeronautics Board, Civil Aeronautics Administration, and National Advisory Committee for Aeronautics, with the assistance of a six-member industry advisory board. Funds for the program would come from Air Force appropriations, and the Secretary for Air would have veto power over proposed projects.

▶ **Five-Year Procurement** — Legislation authorizing five year programming of appropriations for research and development projects was approved by the Senate but did not reach the House Armed Services Committee. It provides that National Defense Establishment research and development funds, obligated during the year for which they were made, shall remain available for re-obligation or expenditure for the four following years.

It also authorizes the Secretary for Air to engage an unlimited number of scientific advisors (at $50 a day, plus $10 subsistence), and to finance up to $100,000 the cost of research, developmental, or test facilities required by contractors.

▶ **National Science Foundation**—Legislation already passed by the Senate and approved by the House Interstate and Foreign Commerce Committee, is slated for House clearance early in the session. The Foundation directed to promote and coordinate basic research in national defense and other scientific fields, would be composed of 24 members appointed by the President with the approval of the Senate, and headed by a director also appointed by the President with the Senate's approval.

▶ **70-Group Air Force**—Legislation outlining maximum authorized strength for USAF was passed by the House, but was not taken up by Senate Armed Services Committee because of lack of time. The bill sponsored by Rep. Charles Clason (R., Mass.), provides for 70 regular Air Force groups and 22 separate squadrons, supplemented by 27 National Guard groups, 34 Air Reserve groups, and auxiliary units, a total personnel strength of 502,000, plus civilian personnel "as may be deemed necessary", a plane force of 24,000, or 225,000 aggregate airframe tons, annual plane procurement rate of 5200 planes, or 42,500 airframe tons.

▶ **Profit Limitation**—Legislation repealing two outmoded provisions of the Vinson-Trammel Act—the limitation of 12 percent profit on military and naval aircraft contracts and the requirement that 10 percent of the Navy's planes be manufactured at the government-owned Philadelphia plant—will probably be brought to a vote and passed by the Senate.

▶ **NACA Personnel**—Legislation authorizing NACA to have ten additional $15,000-a-year professional and scientific personnel, approved by the House and the Senate Post Office and Civil Service Committee, is scheduled for early action by the Senate.

▶ **Travel Promotion** — Three comparatively noncontroversial measures to facilitate and promote international travel, advocated by the Congressional Aviation Policy Board, will be pushed in the special session by Brewster.

One would remove the requirement that air carriers pay the costs for customs inspection services on Sundays, holidays, and at night. Passed by the Senate, the measure is pending before the House Ways and Means Committee. Another would free air carriers from fines for transporting an alien to the U. S. if the alien had a visa issued by a U. S. consular officer abroad. Carriers would be required only to bear the cost of maintenance of the alien while on land, and return him to the country of his origin.

The third measure, sponsored by Brewster, would give the President authority to execute an agreement with the governments of a non-quota country under which nationals of the two countries (for the preceding 18 years) would be permitted to travel for business or pleasure to the other country without obtaining visas—a complicated, time-consuming process.

ANOTHER RUNWAY goes down at Tempelhof. This, like the one in use, is pierced steel plank and will accommodate C-47s and C-54s on the Berlin run.

Report From Berlin . . .

(The greatest peacetime air supply operation ever undertaken is keeping alive about 2,500,000 people in the Western zones of Berlin. Last week, McGraw-Hill World News correspondent John J. Christie sent the editors the following report from the beleaguered German capital.)

BERLIN — "Operation Vittles" is enabling western sections of this besieged city to hold their own against the Soviet land blockade.

The USAF and the RAF in three weeks have turned a dramatic makeshift activity into a relentless routine reminiscent of wartime. Requirements for food and coal in Berlin, however, still exceed present carrying capacity.

(U. S. sources familiar with the Tempelhof layout doubt that larger planes—such as C-97s or C-82s—will be tried at Berlin. Photo shows why. Some of the buildings surrounding the field are visible in left background.)

▶ **Again the "Work Horse"**—So far the C-47 has been the backbone of the operation on the U. S. side, with the British placing the same degree of dependence on their version, the Dakota. Capacity of both is from 2½ to 3 tons.

The 10 ton-carrying C-54 is the only other type so far used by the U. S. New C-54s have been coming in daily. Latest figures: 52 C-54s, 80 C-47s. The British augment Dakotas with 5 ton-carrying Yorks and 7 ton-carrying Sunderland flying boats.

▶ **Corridors** — There are three 20 mile wide air corridors into Berlin. One is used solely for U. S. Berlin-bound planes. Another is used by both incoming and outgoing British planes, and by outbound U. S. planes. The third lane is used in both directions by the Sunderlands.

About 50 miles out, the incoming planes contact Templehof's air-to-ground station. Under visual flight rules, the "four power" Air Safety Center clears the pilots for a gradual let-down to the field traffic control zone.

(Instrument let-downs are made on the radio range or controlled by GCA. The Berlin ILS is out of commission. The inner and outer markers are in the Russian zone.)

▶ **Operations**—The U. S. has been operating two groups of C-47s, and one of C-54s. The groups vary in size and in the ease of the C-54s only 28 of the present 52 C-54s have been taking to the air at one time.

Planes have been taking off on an average of four minutes, although with a 20-minute interval between the last plane of a C-47 group and the first of a C-54 sortie to compensate for the C-54's greater speed.

Except under extremely poor weather conditions, the groups have been flying three missions daily. A mission averages eight hours, including time on the ground for loading, unloading, refueling and maintenance. Crews work two eight-hour shifts. In one recent day, 271 U. S. planes landed at Tempelhof Airdrome and 204 British planes at the Gatow Airdrome.

(For a French view of the Berlin airlift, see Page 30.)

Pilots Call For Cockpit Changes

IAS meeting hears recommendations on high-speed planes. Hage forecasts jet transports coming by 1951.

Los Angeles—Demands for radical changes in the cockpit design of supersonic planes and a prediction that commercial jet transport will become profitable by 1951 were offered engineers at the annual midsummer conference of the Institute of Aeronautical Sciences here July 15 and 16.

Three Douglas test pilots called for more pilot freedom in supersonic and very high altitude craft. Robert E. Hage, Boeing Aircraft Co., described a jet carrier which "should provide a one-type service and be capable of handling 80 percent of our domestic air business."

Such a plane, he said, would carry 30 passengers, cruise 500 mph. at 35,000 ft., and operate at block ranges from 250 to 1000 miles, and "can be both technically feasible and commercially profitable by 1951." He is convinced that public demand will force solution of airways and terminal landing problems confronting jet transport operations.

▶**Mostly Military**—Hage's paper was the sole exception to the intensely military flavor of engineering reports and symposiums. For the first time since the war, IAS required the signing of security pledges for admission to one session, a pilots' symposium on high speed flight. There was a dearth of discussion of engineering problems concerning civil aircraft now in operation.

Air Force Secretary W. Stuart Symington outlined postwar U. S. aviation achievements and spoke at length in support of the 70-Group Air Force program.

Before conference meetings covering structures and aerodynamics at high Mach numbers, delegates had a look at NACA's battery of supersonic wind tunnels at Ames Laboratory and a restricted glimpse of activities at Navy's Air Missile Test Center at Pt. Mugu near Los Angeles.

The test pilots from Douglas Aircraft Co. were Gene May, Robert Brush and Russell W. Thaw. For aircraft flying up to Mach 2.0, they demanded enclosure of the pilot in a fully pressurized escape cell cabin, and pilot freedom from present encumbrances.

▶**Pilot Equipment**—Among these they listed crash helmet, oxygen mask, oxygen emergency bottle and regulator, "G" suit, parachute, life preserver, radio receiver headet, goggles, gloves, boots, pressure vest, and other "gadgets."

Thaw insisted that design engineers give serious attention to production of a jettisonable cabin so equipped that the pilot's encumbrances will be limited to "C" suit, small microphone and writing pad.

He recommended, as a step toward the fully integrated escape cell, that high speed, high altitude aircraft now being developed employ aerodynamic air brakes to slow the craft to a speed safe for pilot ejection, downward ejection of the pilot through the cabin floor to reduce ejection shock hazard, and increased cockpit pressure differential to a cabin pressure of not more than 12,000 ft. with the airplane at 40,000 ft.

The pilots and Dr. C. F. Lombard, aeromedical research authority of University of Southern California, seemed to feel that with the proper design of specialized cockpits and escape devices the chances are good for survival of a flyer encountering structural failure at very high speeds and altitudes.

Dr. Lombard declared that free-fall escape from altitudes considerably above 40,000 ft. should be possible. He said, "There are some indications that a pilot might survive a free-fall escape from as high as 60,000 ft."

A major problem of pilotage at high speeds, Dr. Lombard said, is "psychological stress." He urged that in the interests of flight safety new attention be given to making the pilot comfortable in his aircraft and in reducing the complexity of his flying duties.

"NAV Panel"

Air Coordinating Committee has formed an Air Traffic Control and Navigation Panel to provide technical recommendations on the RTCA SC31 nation-wide traffic control and navigation system. The "NAV panel" is an advisory group to the recently organized Air Navigation and Development Board, which will retain veto rights over the former, indicating that formation of the new panel does not alter the present military control of the program.

The "NAV panel" includes one representative each from the Departments of Commerce, Navy, Air Force, Treasury and from the Federal Communications Commission and will provide programing of the research and development phases of the project. After coordination of the functional requirements and operating procedures for a joint military-civil navigation and traffic control system, the panel will submit its recommendations to the ANDB, which has final say-so on the form of the program.

Engine Procurement To Top Half Billion

Air Force and Naval Aviation will buy $517,000,000 worth of aircraft engines for fiscal year 1949. Official Air Force announcement of contracts follows by a fortnight AVIATION WEEK's July 12 story outlining the engine procurement requirements for aircraft ordered during fiscal 1949.

Variation in airframe delivery schedules based on individual company problems has forced Air Force to revise drastically its engine procurement program to dovetail into the airframe program. This revision has deferred portions of the engine program for fiscal 1950 and 1951 and accelerated other portions for rapid delivery during fiscal 1949. These revisions, however, do not change the overall engine requirements for aircraft which are ordered during fiscal 1949.

Largest volume, both unit and dollar-wise, is that contracted by both services with Allison division, General Motors Corp. which will build 2070 Air Force and 338 Navy model J-33 centrifugal-flow turbojet engines to power the Lockheed F-80, Crumman F9F and Martin P4M aircraft. Air Force will also receive 1125 Allison J-35 axial-flow turbojet engines for Republic F-84, Northrop B-49A and Curtiss F-87 aircraft.

Largest reciprocating engine award is for the Pratt & Whitney R-4360 Wasp Major 28-cylinder 3500 hp. type with Air Force buying 1679 for the Boeing B-50, Fairchild C-119 and Douglas C-124 types and Navy buying 91 for the Martin AM program. P&W will also deliver 153 model R-2800 reciprocating and 634 model J-42 Nene turbojet engines, built under Rolls-Royce license.

Wright Aeronautical Corp. will supply 346 model R-1300 nine-cylinder radial engines to the Air Force for the North American T-28 trainer program, 128 model R-1820 engines for the Air Force Crumman Albatross rescue plane and 682 Navy R-3350 engines for the Douglas AD program.

Westinghouse received initial contract for 1278 model J-34 axial-flow turbojet engines for the Navy jet fighter program.

ECA Aid to France

France will buy $965,000 worth of U. S. aircraft equipment for its commercial airlines.

Procurement of this equipment was authorized last week by the Economic Cooperation Administration and will be handled through normal commercial channels. This was the first aviation purchase to be approved under ECA and indicates that further approvals will be made for participating countries whose airlines use American type equipment.

The French purchases will be confined to engines, propellers and spare parts for Douglas DC-3 and DC-4 and Lockheed Constellation type transports now operated by Air France. French authorities pointed out that the ECA purchases will permit only maintenance of current American equipment used in France and will not be sufficient for expansion of the French civil air fleet by purchase of new American planes.

Paul G. Hoffman, ECA administrator, cited record grain crops throughout the world this year as an indication that more ECA funds would be diverted from relief food needs to capital equipment and machinery maintenance items.

Financial World Awards

On the basis of annual corporation reports, 13 aircraft manufacturers have qualified for "Highest Merit Award" citations from Financial World Magazine, and are now candidates for the award as "best of the aircraft manufacturing industry."

Last year's winner was Glenn L. Martin Co., which had the best 1946 annual report of the aircraft manufacturers. This year's winner will be announced at the Financial World annual report awards banquet Oct. 21, 1948, at the Hotel Pennsylvania, New York City.

Cited for "Highest Merit Award" mention: Boeing, Cessna, Douglas, Fairchild, Crumman, Lockheed, Glenn Martin, McDonnell, North American, Republic, Ryan, Solar and United Aircraft.

AA Raises Copilot Pay

American Airlines has concluded negotiations with its pilots on new maximum-minimum wage scales. Now up for approval by ALPA headquarters, the new agreement would raise the copilot minimum from $250 per month to $290, the maximum from $410 per month to $550.

The increase—from minimum to maximum—will be absorbed in twelve stages, each stage six months long. When approved, the pay increase will be retroactive to Mar. 1, 1948.

Artist's conception of North American T-28.

New Trainers for the Air Force

Order for 268 T-28s to North American; development contract for novel single-engine type to Douglas.

Awards of a production order for 268 T-28s to North American Aviation, Inc., and a $550,000 Air Force contract for trainer development to Douglas Aircraft Co. are the two highlights of a rapidly accelerating trainer program under USAF expansion plans.

The North American T-28, winner of an industry wide competition for an all purpose AF training plane to prepare pilots for high-speed jet aircraft, is conventional in design except for its tricycle landing gear.

The two place craft utilizes a Wright R-1300 engine of 800 hp. and has top speed of 292 mph., with service ceiling of 31,650 ft. It has a normal gross weight of 5862 lb.

The Douglas contract calls for development of a single-engine military training plane with the unobstructed vision of a jet fighter.

Plans call for the plane's Wright R-1300 air-cooled engine to be submerged within the fuselage, aft of the cockpit and over the wings. The tractor propeller would be driven by a shaft which would run underneath the cockpit floor.

Advantage of this system is that it permits both tandem seats to be placed forward of the wings, affording visibility characteristics of a jet plane. Air Force has proposed a detailed study of the engine, shafting and propeller characteristics on a ground test stand, in addition to authorization for construction of a mockup.

INDUSTRY OBSERVER

► Latest Martin Mars flying boat (JRM 2) will have better than twice the payload of the JRMs now operated by the Navy's Fleet Logistics Support Wing on the Hawaii-San Francisco run. The JRM-2 powered by Pratt & Whitney 4360 Wasp Majors (3000 hp.) will carry a 40,000 lb payload compared with 18,000 lb. payload now lifted by the JRMs using Wright 3350s (2400 hp.) JRM-2 will gross 168,000 lb. compared with 145,000 lb for the JRM. The JRM-2 is finishing an overhaul at Alameda, Calif., after an 18 month test program at Patuxent, Md., and is scheduled to begin operational tests on the Pacific Coast this week.

► North American's XAJ-1 carrier bomber, publicly test flown but not yet acknowledged by Navy to even exist, has won high praise by pilots who have flown it. A top Navy pilot has expressed himself as elated with its performance, and believes it will meet all carrier requirements without difficulty.

► U. S. guided missile research may have to turn elsewhere than to the Gulf of Lower California for a long-range proving ground. Plans have been developing for more than a year to create a large missile launching station at El Centro, Calif., and fly the "birds" down the Gulf and out into the Pacific. Shore stations on Mexican soil would give several hundred miles of calibration points and provide a proving range useful for high-speed piloted aircraft as well as missiles. Mexico is believed to have issued a diplomatic "no" to the project.

► Navy's first Lockheed Constitution (XR-60) is due at Naval Air Test Center, Patuxent, Md. this week after a transcontinental hop from California and a brief exhibition at Washington National Airport.

► Plans to modify Convair's B-36, six engine long range bomber from pusher to tractor propellers have now been shelved by the Air Force. Lack of enthusiasm for the strategic possibilities of the giant bomber by the Air Force high command have credited with shelving the change which would have added close to 100 mph to the bomber's speed.

► Air Force is talking with International Telephone and Telegraph and Kollsmann regarding joint development of a new type electronic altimeter. Under the plan Kollsman would handle the instrumentation with IT&T doing the electronics. Present types of electronic altimeters have given considerable maintenance trouble and were recently labeled by CAB as not sufficiently reliable and accurate to be required for civil air transport use.

► Embargo on "munitions" to Palestine is being felt by commercial airlines in the Middle East. At least one of the foreign national airlines has informed the U. S. State Department that it will have to suspend operation of its converted war surplus C-47s and C-45s unless some provisions are made for it to get spare parts. Meanwhile Jack Hardwick, Thomson Trophy racer and Rosemead, Calif. fixed base operator, is advertising tactical type aircraft (P-38, P-39, P-51, B-25, and B-17) as available in quantities with export licenses.

► Tony Levier, Lockheed engineering test pilot and air racing pilot, will bring three greatly modified "Cosmic Wind" racers to the 1948 National Air Races at Cleveland. Modifications include bubble canopies, slimmer fuselages, improved power plant installations and numerous detailed refinements.

► Lockheed TF-80C jet trainer actually has performance considerably superior to the airplane for which it is intended to train pilots. The TF-80C has a top speed of better than 600 mph, while the F-80A and F-80B fighter planes, currently in squadron service, have a top speed of only 558 miles per hour. However, F-80C will have a performance comparable to TF-80C when the new version goes into squadron service next October.

► Boeing has completed windshield de-icing, wing and tail dry air de-icing, engine water injection and automatic propeller feathering CAA certification tests on the Stratocruiser.

Woodhead to Manage Douglas Metals Division

Douglas Aircraft Corp. has entered the pressed metal industrial field and has hired Harry Woodhead to head a separate division created for the purpose. Woodhead recently resigned as president of Consolidated Vultee Aircraft Corp. and has had wide management experience in the steel products and fabrication fields.

Douglas has been engaged in limited production of automobile fenders, radiator shells and other pressed metal automotive products and anticipates a rapid growth of the new division to meet the demand for formed steel products on the West Coast. However, the company will not decrease its principal interest in aircraft design and manufacture.

The present Douglas management will control the new division, but its development program will be independent of the airframe activities of the company. Woodhead will be assisted by A. W. Larsen, former Convair purchasing director.

AVIATION CALENDAR

July 24-Aug. 1—Southwestern Soaring Contest, Grand Prairie, Tex.
July 26-27—California Aviation Trades Assn. annual state convention, San Diego, Calif.
July 29—Alabama Flying Farmers organization meeting, Polytechnic Institute, Auburn.
July 30-Aug. 1—Cleveland Junior Chamber of Commerce Air Tour, Cleveland, Ohio.
July 31-Aug. 8—International Air Exposition, New York International Airport (Idlewild), N. Y.
Aug. 6—Statewide Aviation Forum, Peoria, Ill.
Aug. 18-20—Society of Automotive Engineers, West Coast meeting, St. Francis Hotel, San Francisco.
Aug. 24—ICAO African-Indian Ocean regional air navigation meeting, Seattle.
Aug. 26-27—International Wakefield Trophy Model Airplane Meet, Akron, Ohio.
Sept. 5-6—National Air Races, Cleveland.
Sept. 5-11—Seventh International Congress of Applied Mechanics, Imperial College of Science and Technology, South Kensington, London, England.
Sept. 7-12—SBAC aircraft show and display, Farnborough, England.
Sept. 9—IATA legal committee, Brussels.
Sept. 13—IATA executive committee, Brussels.
Sept. 16-17—National Instrument Conference, Instrument Society of America, Convention Hall, Philadelphia.
Sept. 14-18—IATA fourth annual general meeting, Brussels.
Sept. 19-21—Twelfth International Convention, Northwest Aviation Planning Council, Vancouver, B. C.
Sept. 20—IATA executive committee, Brussels.
Oct. 6-8—National Association of State Aviation Officials, Copley Plaza, Boston.
Oct. 6-9—Society of Automotive Engineers aeronautic meeting, Biltmore Hotel, Los Angeles.
Oct. 14—Annual Air Line Dispatchers Association convention, Edgewater Beach Hotel, Chicago, Ill.
Oct. 18-24—International aircraft exhibit, Royal Danish Aeronautical Society, Copenhagen.

ENGINEERING & PRODUCTION

Kellett Control

Hughes, Fairchild fight for rights to helicopters that USAF may order.

Struggle for control of the Kellett Aircraft Corp. military helicopter projects is being waged between Hughes Aircraft Co. of Culver City, Calif., and Fairchild Airplane & Engine Corp. of Hagerstown, Md.

At stake:

• **The XR-10**, a twin engine, 12 passenger experimental helicopter built by Kellett under Air Force contract. Phase I tests on the XR-10 have been completed successfully and there are good prospects of a quantity production order if the Air Force is satisfied as to the financial stability and productive capacity of the firm taking over the project.

• **The XR-17**, a joint Kellett-General Electric experimental project under Air Force contract for a giant, jet-propelled "flying crane" helicopter. The XR-17 is powered by two TG-180 jet engines with four burners at the tip of each 65 ft. diameter rotor blade. It is designed to carry a 24,700 lb. load for 65 miles.

• **The future** of Kellett Aircraft Corp., its helicopter engineering personnel, and its refrigerator and desk manufacturing businesses.

Kellett Aircraft Corp. has been in process of reorganization under Chapter X of the Federal Bankruptcy Act since October of 1946. Latest development is submission of a reorganization plan to the U. S. District Court in Philadelphia by the corporation's trustees Effingham B. Morriss Jr. and Paul R. Skilling.

► **Fairchild Offer**—This plan calls for sale of the Kellett helicopter division to Fairchild for $185,000 and the use of proceeds to pay off unsecured creditors in full. It also provides for issuance of new no par common stock to present holders of $1 per common on the basis of a half share for each share held at a price of $1 a share.

Fairchild is to pay $100,000 for "certain intangible assets" which the trustees say "will have little if any realizable value" if the firm is liquidated. An additional $85,000 would be paid for machinery and equipment of the helicopter division. This would include transfer of all Kellett rotary wing data and the right to hire any or all Kellett helicopter division employes.

► **Needs Approval**—If the Fairchild deal is approved by the court and Kellett stockholders, the trustees say the reorganized firm would concentrate on refrigerator production. They also claim net current assets of about $600,000 would be available to the firm.

Meanwhile the court has been petitioned for an extension to August 13 as the final date for filing reorganization plans in order to allow Wallace Kellett, corporation president and the board of directors to submit a counter plan based on offers by Howard Hughes Aircraft Co.

► **Hughes Jet Interest**—Hughes is interested primarily in the XR-17 jet helicopter project but is also willing to take on the XR-10 production contract if any is forthcoming. Hughes has been attempting to negotiate with Kellett trustees since last winter. Negotiations between Hughes and the trustees were terminated recently when the trustees reached a tentative agreement with Fairchild. The Hughes interests are now dealing with the Wallace Kellett regime which is bitterly opposed by Wallace's brother Roderick, executive vice president, and Nicholas Ludington, a heavy stockholder in the Kellett corporation.

Air Force has indicated that both the Fairchild and Hughes companys are acceptable to execute any future contracts on the XR-10 and the XR-17.

► **Hughes Proposals** — The various Hughes proposals were aimed primarily at securing the Kellett share of the XR-17 contract and five key Kellett helicopter engineers. Present Hughes proposal now under consideration by Wallace Kellett and the directors involves a flat payment of $100,000 to Kellett and making an additional $75,000 available to the firm as additional working capital. This would be at normal interest and secured by the firm's assets. Under the agreement Kellett Corp. would be free to develop other helicopter projects now in preliminary design stage.

Hughes has indicated he is willing to modify this offer in any manner that is mutually satisfactory and may be necessary to meet the requirements of the Air Force and Kellett Corp. stockholders.

Under the Hughes proposal work on the XR-17 now under way at the Kellett Corp. North Wales, Pa. plant would continue there until such time as the prototype would be transferred to the General Electric facilities at Schenectady, N. Y. Any XR-10 production work would be done at Hughes' Culver City plant.

Airframe Executives' Pay Reported to SEC

J. H. Kindelberger, as president of North American Aviation, Inc., received what may be the airframe manufacturing industry's top salary in 1947. He was paid $121,083, according to reports filed with Securities & Exchange Commission. Kindelberger now is NAA's board chairman.

Donald Douglas' $96,400 was the second highest listed for the airframe manufacturers that have reported so far to SEC.

► **Others** — Among other payments listed, all for the companies' fiscal years.

• **North American Aviation**—J. L. Atwood, first vice president, now president, $67,866; R. H. Rice, vice president-engineering, $38,000; Chadbourne, Wallace, Parke & Whiteside, general counsel, $48,910; Demarsey, Thayer, Delbert & Kumler, tax counsel, $30,000.

• **Douglas Aircraft Co.**—F. W. Conant, senior vice president, $40,400; Arthur E. Raymond, vice president, $42,400; Ernst & Ernst, accountants, $36,730.

• **Republic Aviation Corp.**—Mundy I. Peale, president, $41,850; Alexander Kartveli, vice president, $70,650; the late Alfred Marchev, board chairman, $24,261; Bleakley, Platt, Gilchrist & Walker, general counsel, $46,000.

• **Beech Aircraft Corp.**—Walter H. Beech, president, $50,220; John P. Getty, vice president and general manager, $30,045; T. A. Wells, vice president and chief engineer, $30,435.

• **Bendix Aviation Corp.**—Malcolm P. Ferguson, president, $68,750; Charles Mareus, vice president, $64,497; D. O. Thomas, director, president of Bendix-Westinghouse Automotive Airbrake Co., $47,525; K. P. Lansing, vice president, $46,500; W. H. Houghton, vice president, treasurer, $43,700; A. A. Kucher, vice president, $23,900; R. T. Hurley, vice president, $36,700; Hughes, Hubbard & Ewing, legal counsel, $141,419; Hubbard, McCullough & Fox, legal counsel, $22,000; Carl Byoir & Associates, public relations counsel, $36,000.

Bendix Strike Settled

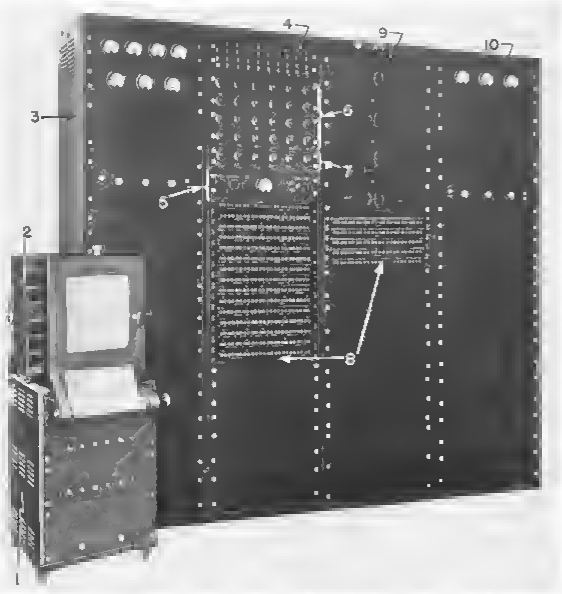
The final chapter was written on the topsy-turvey strike situation at Bendix Aviation Corp.'s five divisions when the company and UAW-CIO signed a two-year agreement covering a 13 cent an hour increase.

An additional half-cent an hour increase was granted workers at the South Bend and Zenith Carburetor divisions to cover any inequities. Provision in the final agreement also allows for new wage talks to be opened one year after signing.

Pay Increase at Northrop

Northrop Aircraft, Inc., has awarded pay increases to all hourly paid and salaried employes at its Hawthorne, Calif., plant.

Wages of the hourly paid employes were increased 10 cents an hour; salaried employes were granted a blanket $20 a month raise.



Components of electronic analogue computer: 1, recorder; 2, adjustments for the pen displacements, 3, computer unit power supply; 4, computer unit, 5, control switches, 6, scale factor potentiometers, 7, initial condition potentiometers, 8, the patch bays, 9, servomechanism unit; and 10, power supply for the servomechanism.

Office-Size Electronic Computer

New device, born of war development, provides fast solutions to complex equations used in research.

By Herbert H. Adise*

Solution of complex mathematical equations by hand method has always been one of the basic time-consuming factors in aircraft development projects.

Though electronic "brains" were constructed before and during the war to simplify solution of involved mathematical processes, greatest drawback to their general application was their tremendous size and cost.

Now available is an office size version of a computer originally developed for the Special Devices Center of the Office of Naval Research, and also used by the National Advisory Committee for Aeronautics and major aircraft companies.

▶ **Cost, Time Cut**—The refined version, marketed commercially by Reeves Instrument Corp. as REAC (Reeves electronic analogue computer) is capable of solving higher order, ordinary, linear and non linear differential equations.

Using the computer on problems submitted by various airplane companies and universities, it was found that cost of obtaining answers as adequate as those resulting from hand computation was reduced by as much as 95 percent.

Problems which were estimated to require 2949 man-days for solution by trained mathematicians using numerical methods were solved in 108 man-days using the computer.

Cost of hand solution was $73,725 compared to $3240 for computer solution.

▶ **Components**—The complete device consists of four cabinets, each requiring about as much floor space as a filing cabinet, and a recorder unit. Only the recorder unit and two cabinets—computer and servomechanism unit (Fig. 1)—need be accessible to the operator. The other two cabinets—power supplies not used by the operator—may be installed elsewhere.

In the computer unit are summing, integrating and inverting amplifiers, scale factor potentiometers, and initial condition potentiometers.

In the servomechanism unit are the servos and resolvers.

▶ **Amplifiers**—Summing amplifier is a d.c. device which has the property of furnishing an output voltage having a negative value equal to the algebraic sum of several voltages applied at the amplifier input. As many as seven input voltages may be applied to each summing amplifier. Each input has a separate amplification factor, one has an amplification of ten, two have an amplification of four, and four have an amplification of one.

Integrating amplifier is a d.c. unit provided with a feedback capacitor. It provides an output voltage, which is both negative and equal to the time integral of the algebraic sum of the input signals.

Inverting amplifier, whose principal of operation is identical with that of the summing amplifier, is used to change the sign of a variable. Each inverting amplifier is provided with two inputs so that they may be used as summing amplifiers if necessary.

There is a total of twenty amplifiers in the computing unit—seven integrating, seven summing, and six inverting amplifiers. Each is mounted on a separate chassis. If an amplifier fails and it is desired to replace it without waiting for repairs and trouble shooting, it may be removed from the chassis, like a plug from a wall socket, and a new unit substituted.

▶ **Potentiometers**—In addition to the amplifiers, there are 24 scale factor potentiometers, controlled by knobs on the front panel. These are provided to get other than integral coefficients of 10, 4, or 1. When a scale factor potentiometer is connected to the input of a summing or integrating amplifier, the amplification factor may be varied to any fractional value.

Also included in the computer unit are six initial condition potentiometers providing the integrating amplifiers with voltage equal to the constant of integration.

Inputs and outputs to each amplifier and potentiometer are connected to jacks in the patch bay mounted on the front panel of the computer. The basic units involved in a problem are then connected by means of patch cords.

The computer unit can be used without the servomechanism unit to solve ordinary linear differential equations with constant coefficients up to and including the seventh order.

▶ **Problem Posed**—Typical of the prob

* *Aerodynamist, Reeves Instrument Corp.*

lems which fall into this category is that of the determination of the longitudinal stability of a transport aircraft having a proportional type of automatic pilot. In this pilot system, the elevator is automatically operated as to compensate for any deviation in pitch from the horizontal, as produced by gusts and the like.

The problem is to determine the proportionality between deviation in pitch and the resultant elevator deflection, within the time delay of the control system, so as to produce the smoothest flight. The equations of motion in operator form are

$$(p + 2)\alpha - p\theta + 0.1\delta_e = 0 \quad (1)$$
$$(p^2 + 5p)\theta + (p + 2.5)\alpha + 5\delta_e = 0 \quad (2)$$
$$\delta_e = K(1 + .1p)\theta \quad (3)$$

where p is the mathematical operator (d/dt), α is angle of attack, θ is pitch angle, δ_e is elevator deflection, and K is the proportionality constant.

Initially, that is, at computer time equals zero, all variables are zero. A disturbance such as a gust may be introduced in the form of a step function in voltage corresponding to angle of attack. A block diagram of the corresponding computer circuit is shown in Fig. 2.

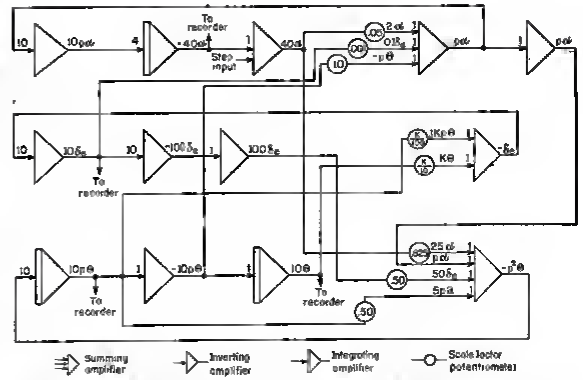
All inputs are disconnected by flipping a single switch while the problem is being set up and the step functions inserted. When the circuit has been completed, a switch is thrown which sets the relays in the appropriate manner, and the solution is recorded by picking off the voltages at the outputs of the appropriate amplifiers as indicated in the diagram.

▶ **Solution Recorded**—The recorder is a special six channel oscillograph which makes a permanent, directly readable record of the solution. When the solution is completed, the starting switch is thrown back, opening the inputs again, and resetting the initial conditions.

Merely changing the appropriate potentiometer setting between solutions permits an extremely rapid investigation of the effect of proportionality rate on stability. For this particular auto pilot problem, approximately two man-days would be required to prepare these equations, patch them into the device and obtain and process 75 solutions. Time required for numerical solution would run into months.

If the particular aircraft were still in design or flight test stages, it is similarly simple to investigate the effect of change in configuration, aerodynamic characteristics, and the like, without extensive cut-and-try modifications, or possibility of endangering a pilot's life or damaging the airplane.

▶ **Servomechanism Unit**—Additional scope and flexibility is added to the machine by the use of the servomechanism unit. This contains servos which are used to carry out multiplications and divisions of two variables, and resolvers which provide trigonometric functions of a variable.



Schematic of circuit for assumed problem of stability of aircraft with automatic pilot.

This unit makes it possible to solve linear differential equations with variable coefficients, as well as many types of non-linear differential equations. A feature of the servomechanism unit is that a special functional potentiometer can be provided, which when connected to a servo shaft, will reproduce any reasonable functional relationship between two variables.

In the auto pilot problem, for example, if the airplane were supersonic, the servomechanism unit would permit an investigation of the stability and flight path during acceleration from subsonic to supersonic flight. The change in aerodynamic derivatives with Mach number, the change in total forces and moments with velocity and density, variation in engine thrust characteristics, and other variations could all be taken into account.

In addition to these problems, the machine may be applied to many other problems of the same class. In the field of mechanical design this would include motion of mechanical parts.

▶ **For Jet Work**—The growing importance of jet and rocket engines presents a whole new series of problems—the design of fuel control systems to handle the extremely high flow rates with the precision required for fuel economy; the dynamics of the combustion process, accelerating turbine rotors, variable-opening jet exits, and heat transfer, operation of jet and rocket engines under accelerated flight conditions; transient operation of pulse jets.

In these applications, the equations of motion, thermodynamics, kinematics and the like are patched into the machine and performance is observed under various combinations of system parameters and initial conditions.

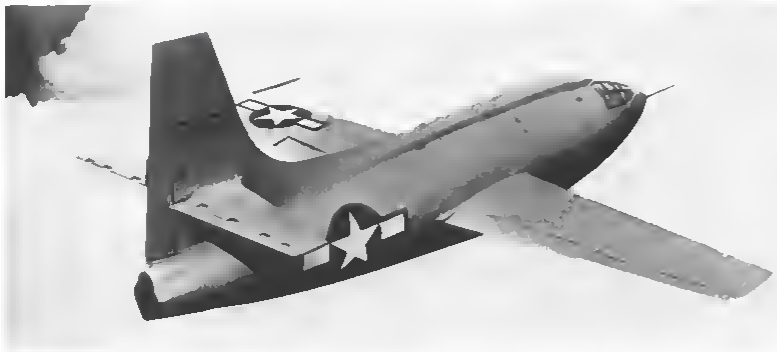
Rapid rate at which solutions are obtained and the ease with which additional factors may be varied or introduced permits a thorough investigation before design is undertaken.

▶ **Structures Application**—Many problems in aircraft structures are also readily applicable to solution. These include the deflection of skin and internal members under varying air loads and surface heating conditions, and stress in landing gears, hulls or pontoons during landing or take-off, etc. Records of solutions may be used to accurately establish the envelopes of velocity acceleration diagrams, and the structure criteria.

In addition to pure simulation, the computer may be used as a testing device. For Example, referring to the problem illustrated in Fig. 2 instead of simulating the automatic pilot by means of equation (3), the actual auto pilot may be tied in to the machine in such a manner that a d.c. voltage proportional to elevator deflection is fed in.

The machine now has only the two equations of aircraft motion patched in, and therefore produces a voltage proportional to the pitch rate. This is used to drive a pitch table at a rate equal to that in the true aircraft. The auto pilot mounted on this table reacts exactly as under flight conditions. Entire engine and propeller control systems may be tested in this manner.

The REAC was designed and constructed by Harry D. Belock, chief engineer and general manager, and Rawley D. McCoy, project engineer. Techniques of applying the equipment to the solution of various problems were developed by Eleazer Bromberg and Stanley Fifer, heads of the analysis and computer group, in the course of eighteen months use.



XS-1: Design and Development

World's first supersonic plane outgrowth of meeting held in 1944. Although of conventional configuration, craft has novel features.

By Robert McLaren

In this dawn of high speed flight, there is little doubt that attainment of supersonic speed by the Bell XS-1 research airplane on Oct 14, 1947 ranks in historic importance with the first flight of the Wright Flyer on Dec 17, 1903.

Although it required slightly less than 44 years for man to fly faster than sound, there exists little mystery as to how it was accomplished, for aeronautical engineering has had as its twin objectives throughout all those years, two major factors that made the achievement possible—high power and low drag.

Because the fastest airplane, other things being equal, is the one with highest power and lowest drag, these two factors determined the basic lay out of the XS-1 right from the start.

Since speed was its fundamental requirement, considerations of armament, combat equipment, vision, maneuverability, serviceability and cost did not compromise the plan, hence the task was simplified.

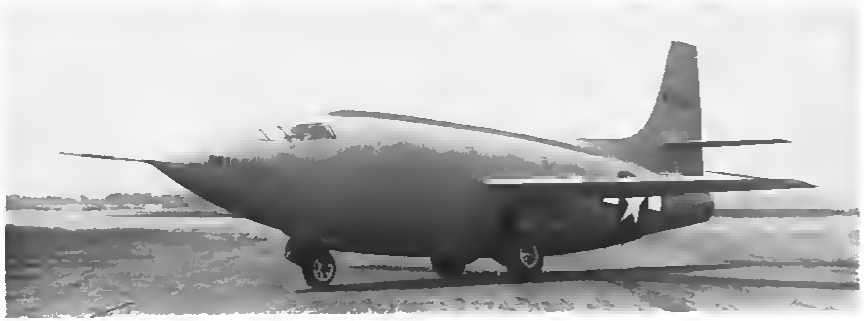
▶**Program Formulated**—The need for a special research plane capable of supersonic speed had become increasingly apparent to government agencies and industry in the Fall of 1943 as wind tunnel work pushed up into the transonic speed regime and difficulties attendant thereto became pronounced.

Researchers of the National Advisory Committee for Aeronautics discussed these problems informally with engineers of the (then) Army Air Forces and Navy Bureau of Aeronautics, who readily saw the practical benefits to be obtained from piloted-aircraft research at speeds near that of sound.

These informal discussions precipitated a joint NACA-Air Force-Navy meeting at Langley Field, Va., in March, 1944, during which a broad program of high speed piloted flight research was formulated.

The joint program authorized the NACA to prepare basic design data for a series of aircraft capable of flying faster than the speed of sound, to design and develop special research instrumentation for these craft and to act as expert advisor to the services in the projects.

The Air Force and the Navy were obligated to provide the funds, administer the procurement of the aircraft, provide the test site, equipment and housekeeping facilities, and to determine the tactically useful portions of data obtained.



▶**Bell, Douglas Roles**—NACA design studies began immediately, and wind tunnel tests, performance calculations and aerodynamic requirements of the aircraft had crystallized by December, 1944, at which time Bell Aircraft Corp. and Douglas Aircraft Co., Inc. were invited to participate in the program, designing and building the research planes.

The Bell project was designated the XS-1 and was assumed by the Air Forces. The Douglas project was designated D-558 and was assumed by BuAer. Both projects were later expanded to include sweptwing configurations.

▶**XS-1 Requirements**—The Bell XS-1 contract was let in the form of a regular Air Force procurement contract specifying in detail the airplane requirements to be met and features to be incorporated. It was decided that the XS-1 should, first of all, be a conventional design in order to determine if the familiar configuration could attain supersonic speed.

Fabrication was to require only readily available shop techniques such as would be expected in the quantity procurement of a military plane. Only unusual contract requirement, apparent from available research information, was extremely high structural strength, half again that of any previous design.

Other contract requirements included a test equipment load of 500 lb., demonstration in flight of an 8G pull out at an indicated speed of less than 500 mph., an 8G pull-out at minimum speed, proof of the specified endurance at rated thrust, takeoff and climb to 35,000 ft. under its own power, and satisfactory response to controls at a speed of Mach 0.8.

▶**Mother Plane**—The end of the war in August, 1945, made available for the project a Boeing B-29 bomber, and it was decided that the air-launch method would be used for the flight test program, thereby saving more than half the available fuel and reducing the considerable takeoff hazards involved in an airplane with a wing loading of approximately 100 lb per sq. ft. (The XS-1 has not made a ground takeoff to date, nor are there any plans for such an attempt with the present airplanes.)

▶**Glide Tests**—The craft was completed late in 1945 but the rocket engine was not available, and plans went forward for glide tests without the engine. During February, 1946, 10 glide flights were made by the late Jack Woolams at Pinecastle, Florida. This Air Force field had 10,000-ft. runways, although not more than 3000 ft. was ever used in an XS-1 landing.

These glide tests began at about

Narrow confines of pilot cabin are evident in this view of XS-1 being readied for flight.

Unusual empennage and landing gear arrangements are apparent in this rear view.

27,000 ft and the XS-1 touched down at about 12 mm at a speed of about 110 mph. The plane was flown in the empty condition, the purpose being to perfect the launching technique.

During the tests it was determined, as predicted, that the air-launched method was entirely safe and satisfactory regardless of the speed, power or flap setting of the B-29 mother plane because of a positive pressure region between the two airplanes created by mutual aerodynamic interference. This pressure provided a natural "push" to the XS-1 rendering unnecessary the special guide rails and ejector unit designed for the purpose.

The tests also determined satisfactory stability and control of the design.

▶**To Muroc**—The rocket engine was delivered, and special equipment for rocket fuel storage and handling erected at Muroc Air Force Base, Calif.

This consisted of a 15,000-gal. storage tank for liquid oxygen, 3300-gal. storage tank for liquid nitrogen, and a special mixing tank for alcohol and water mounted on a small fuel trailer.

A pit was dug into which the XS-1 could be rolled for attachment to the B-29.

The engine was installed and ground tests conducted at the Bell plant from June to September. Following this, the plane was flown to Muroc in the B-29 early in the fall of '46. Four glide tests were made with increasing gross weight, by Chalmers H. "Slick" Goodlin, who after Woolams' death, had been assigned as pilot for the contractor's demonstration flight program. On the last of these glide tests half the design fuel load was carried and jettisoned satisfactorily.

▶**Powered Flight**—Finally, on Dec. 9, 1946, the XS-1 was carried aloft and launched at 27,000 ft. Ten seconds later No. 1 rocket chamber was fired, followed shortly by No. 2. The craft accelerated so rapidly, however, that No. 2 chamber was cut out and the plane nosed up to 35,000 ft. where No. 2 chamber was again ignited.

With this 50 percent power, the XS-1 moved quickly to Mach 0.79, when all power was shut off. The plane glided down to about 15,000 ft. and all four chambers were cut in. This first application of full power resulted in an extremely rapid climb and all motors were cut off.

The XS-1 glided to a landing after its first power flight during which a speed of 550 mph was attained, satisfactory power-on motor control and handling characteristics demonstrated, and a clear indication of the future possibilities of the design obtained.

Bell pilots completed 20 powered flights demonstrating the required performance of the XS-1 to the Air Force, and early in August, 1947 Capt. Charles E. Yeager was assigned to the project. Meanwhile the second airplane had been delivered to the NACA, and research pilots Howard C. Lilly and Herbert H. Hoover assigned to the project.

▶**Sonic Speed Exceeded**—Powered flights continued at increasing speeds altitudes and rates-of-climb until Capt. Yeager exceeded the speed of sound—for the first time in history—on Oct. 14, 1947.

Shortly thereafter, NACA pilots Lilly and Hoover and Air Force Maj. G. E. Lundquist and Capt. J. T. Fitz-Gerald exceeded Mach 1.0 in XS-1 flights.

To date, about 55 flights have been made in the two XS-1s, and in about a dozen of these flights supersonic speed was attained.

▶**Wing Details**—Detailed design of the XS-1 was directed by Robert J. Woods, Bell chief design engineer, Stanley Smith, original project engineer, and Richard Frost, present XS-1 project engineer.

The wing utilizes an NACA 65-110 section on the airplane being flown by NACA, and an NACA 65-108 section on the Air Force craft. This profile is one of a series of low-drag airfoils developed by the NACA during the war. It has a design lift coefficient of 0.1 and the minimum pressure point is at 50 percent of the chord. It has a critical Mach number of about 0.80 and a low-drag range of lift coefficients from slightly more than 0.05 to slightly less than 0.15, which are obtained at an angle of attack of about 1.0 deg. An angle of incidence of 2.0 deg. is used on the XS-1.

The wing has a span of 28 ft., area of 130 sq. ft., aspect ratio of 6, and equal taper on leading and trailing edges. It is, obviously, a conventional wing in layout.

To meet the design load factor of 1.8 specified by the contract, the skin is machine tapered from slightly more than 0.5 in. at the root to slightly more than 0.125 in. at the tip. This unusual skin thickness simplified both the design and fabrication problems and little difficulty was experienced with providing local stiffening and preserving the profile contour to reasonably accurate limits.

The port wing panel has 240 drilled holes with special inserts comprising pressure orifices for distribution measurement in flight.

▶**Stabilizer, Control Cables**—The stabilizer is of similar design and construction to that of the wing but is fitted with a screwjack operated by a pneumatic motor. The jack has a high-pitch thread permitting extremely rapid adjustment of the stabilizer incidence angle to permit pilot to accommodate large changes in downwash loads quickly.

Rudder and elevator control cables are carried along the top of the fuselage in a special fairing to prevent interference with the spherical fuel tanks within the fuselage.

▶**Fuselage Cabin Details**—The fuselage is of conventional semi-monocoque construction of 24ST.

The pilot is located in the nose behind transparent panels that conform to the ogive shape of the forward fuselage.

These panels were double panes of Plexiglas, the area between the panes being dehydrated to prevent fogging. Plexiglas was used because of ease of forming, but the heat generated by obtainable high speed will require the substitution of plate glass. The latter

Bell XS-1

Reaction Motors RMI-6000c4
6000 Lb. Thrust

	Present Airplanes (pressurized)	Original Design (turbine pump)
Span	28 ft	28 ft
Length	31 ft	31 ft
Height	11 ft	11 ft
Wing area	130 sq. ft.	130 sq. ft.
Empty weight	6892 lb	4818 lb
Gross weight	13,400 lb	13,034 lb
Maximum speed	M 1.5 (1000 mph @ 60,000 ft.)	M 2.5 (1700 mph @ 80,000 ft.)
Maximum rate of climb	28,000 fpm	45,000 fpm
Endurance (full power)	2.5 min.	4.2 min.
Landing speed	132 mph.	110 mph.

requires special manufacturing techniques because of double curvature of the panes

The cabin is pressurized to a differential of 3.0 psi and is tested to a leakage of no more than 1.0 psi per hour.

A control wheel is used, rather than a stick, to enable pilot to exert a maximum of force if required. The rocket motor selector control, instrumentation switches and emergency power cut off are all located on the control wheel to enable pilot to operate them without moving his hands from the wheel.

►**Tanks**—Power plant factors in the XS-1 consist of 8177 lb. of fuel and 210 lb. of engine, a graphic index to the disproportion of weight in a rocket aircraft.

The liquid oxygen tank is located behind pilot, and fills the interior of the fuselage back to the front spar of the wing. This tank is fabricated from 0.1875 in. annealed stainless steel and is designed to a factor 1½ above the working pressure.

Aft of this tank is the center fuselage, which provides stowage for the retracted landing gear, the NACA instrumentation and two of the high-pressure nitrogen tanks on the fuselage floor. These tanks are made from Great Lakes Alloy NAX 9120 and vary in thickness from 0.125 to 0.625 in.

Aft of this center section is the ethyl alcohol tank of 0.125 in. normalized SAE 4130 steel.

The rocket motor is mounted in the extreme aft end of the airplane.

►**Fuel System Change**—Delays in the development of several items of mechanical equipment resulted in changes in the XS-1 power plant.

It was originally planned to provide pressure feed for the propellants by a turbine driven pump. This device represented a considerable development problem because its reliability had to be guaranteed in addition to its performance.

Long before the airplane neared completion it became apparent that this unit would not be ready in time, hence the fuel system was changed to a pressurized tank system, the propellants being forced to the rocket chambers by internal tank pressure rather than by the pump. This pressure is provided by nitrogen stowed in the tanks previously described.

It was known, however, that commercially available oil-free nitrogen is sold in cylinders at only 2200 psi, far less than that required. This problem was solved by Bell's development of a nitrogen evaporator in which liquid nitrogen is forced from a 36-in. stainless steel sphere through a heat exchanger where the liquid "boils off" as high pressure gas. The sphere mentioned has a wall thickness of 3 in., is cast in halves, welded around the circumference, and will sustain a pressure of 9000 psi.

Gaseous nitrogen is piped from this evaporator into the nitrogen tanks within the plane. In addition to pressurizing the propellant tanks, this pressure is also used to operate the landing gear, flaps, stabilizer adjusting mechanism, and numerous valves. There is no control boost system on the airplane.

Change to pressurized fuel tanks increased the empty weight of the XS-1 by about 2000 lb., reduced its endurance by 1.5 min. because of reduction in volume of fuel carried, and increased its landing wing loading to about 55 lb. per sq. ft.

The turbine-driven pumps have since been developed and will be installed in later models of the XS-1.

►**Power Plant Makeup**—The rocket motor was developed by Reaction Motors, Inc., Pompton Lakes, N. J. It consists of four separate chambers grouped into a single motor. By using four small chambers rather than a single large one, an approach to engine throttling was achieved, thereby increasing the pilot's control of thrust variation.

The four chambers, each of which produces 1500 lb. thrust, can be fired separately through the switches on the control wheel, thus providing variable thrust in 25, 50, 75 and 100 percent proportions. Original plans for a variable fuel throttle on each chamber have not yet been incorporated.

The chambers operate at a pressure of 230 psi and the combustion temperature is about 5000 R.

To cool the chambers, a regenerative system is used in which the fuel is circulated through a cooling jacket around each chamber before it is injected into the combustion chamber. The ethyl alcohol fuel is mixed with 25 percent of water to assist this cooling. The addition of the water has only a slight effect on the thrust of the motors.

Instrumentation of the XS-1 comprises its essential load. It is the transportation of these instruments into the transonic speed regime that is the basic function of the project. Of the three major questions posed by transonic flight—stability and control, structural loads and pilot reaction—two are answered by the special instrumentation carried.

►**Stability and Control Instruments**—These record control surface position, control operating forces, acceleration, rolling velocity, and side slip angle.

The control surface position is obtained by a slide wire resistor located on the rudder, elevator ailerons and horizontal stabilizer. As these surfaces are moved, the electrical resistance of the resistor is changed and recorded.

Control forces are obtained by strain gages mounted on the rudder pedals, control column and control wheel. Changes in the resistance of these wires are recorded.

Acceleration of the airplane in the vertical, horizontal and longitudinal directions are obtained by a recording accelerometer, which consists of three flexible metal strips with weights attached, the weights tending to retain their position in space through inertia as the airplane attempts to displace them.

Rolling velocity is recorded from a rate gyro, which indicates the rate of roll rather than the degree of role as in the conventional gyro instrument.

Side slip angle is measured by a small vane located on a boom projecting from the port wingtip. As the side-slip progresses this vane weathercocks into the wind and actuates a remote control transmitter.

To correlate these data, airspeed and altitude are recorded from static and dynamic pressure readings.

All recording is accomplished through use of a beam of light directed at a mirror and reflected to a strip of film. The quantity to be measured varies the angular position of the mirror, resulting in changes in the light trace on the film. The film contains a time pulse trace and reference traces to permit interpretation and correlation of the data traces.

In addition to these recorded data, the data on elevator position, aileron position, airspeed and altitude are telemetered to the ground throughout the flight to aid in analysis in the event the airplane is damaged in the air or lost in a crash.

►**Structural Loads**—These are measured via strain gages mounted on the spars in the root section of the wing and tail. These data are recorded in flight.

Information on pressure distribution changes during the flight is obtained from 240 pressure orifices in the upper and lower surfaces of the port wing and 160 orifices in the tail, and data are also recorded in flight.

As a check on the flight, ground radar equipment is used to trace the path of the airplane. By filming the radar scope and indicating time intervals the speed and altitude of the craft may be determined at any given time during its flight.

This film is examined after the flight and coordinated with the altitude and airspeed recorded in the airplane.

►**Air Force, NACA Objectives**—This instrumentation system was developed by the NACA over a period of many years, some of the methods being in use, others being used on the XS-1 for the first time.

The Air Force airplane is less completely instrumentated because of the different nature of the test program. In general, the Air Force objective is to determine maximum performance of the airplane both with respect to its speed, ceiling, rate-of-climb, etc. and its structural strength. Its aim is to obtain from the XS-1 all data pertaining to design and operation of supersonic combat aircraft.

NACA objective is to obtain a maximum amount of scientific research information on transonic aerodynamic phenomena.

For these reasons, the airplanes vary slightly in configuration (the Air Force XS-1 has an 8-percent wing and 6-percent tail, the NACA airplane 10-percent wing and 8-percent tail), instrumentation and flight test program (the NACA craft is being flown at slight speed increments through the speed of sound, the Air Force plane at much broader increments).

NACA research engineers handle the instruments, their records and their analysis of both airplanes.

►**Role Not Ended**—The attainment of supersonic speed by the XS-1 airplane is only the beginning of its usefulness as a scientific research tool.

Ahead now in the program is the tedious job of flying the planes at various speeds, altitudes, attitudes, through various maneuvers and under a wide range of atmospheric conditions to obtain data necessary to understand thoroughly the problems of the transonic zone.

For this reason the XS-1 will continue in service for several years and will be joined in the coming months by other types designed for the same purpose.

British Planes for India

(*McGraw-Hill World News*)

HYDERABAD — Deccan Airways, Ltd., which flies India's longest internal service—from Madras to Delhi up the country's "backbone"—is giving British planes a whirl.

Heretofore the line has been operating with converted Dakotas. Now an order has been placed in Britain for three Airspeed Ambassadors.

The order reflects the trend in India. Although a year ago every domestic airline used Dakota conversions today British planes are shouldering into an important place. Already in service are Vikings, Wayfarers, and Doves.

Only two lines are known to have new American aircraft on order. Pakistan's Orient Airways is waiting for some Convair Liners, and Indian Overseas Airways (formerly Mistri Airways) announced some time back it had ordered two Martin 2-0-2s.

THIN BLANKET of spun glass, substituted for graphite as an anti-friction agent, is seen below formed magnesium sheet being removed from stretch press

Spun Glass Aids in Metal Forming

New material, woven into blankets, simplifies shaping magnesium sheets which must be worked when hot.

Spun glass, woven into thin blankets, is being used at Glenn L. Martin Co., Baltimore, in the stretch forming of magnesium sheets as a successful substitute for less efficient materials.

In the aircraft industry's original experience with light metal, the stretch forming of sheet aluminum, it was found that the metal would not stretch properly because of friction set up by the pressure between the sheet and the stretch block, causing an uneven flow which produced an unsatisfactory, irregular, wavy surfaced finish.

Practice often used in industry for the solution of this problem is to paint the material to be formed, and the stretching block as well, with a heavy coating of grease.

This liberal use of grease produces a messy and dangerous working condition. Then, after the forming operation, removal of the grease frequently produces hand cuts, and in addition, is a costly, time-consuming processing operation.

Substitution of a sheet of rubber for the grease effected favorable results for the cold forming of aluminum sheets.

►**Magnesium Different**—However, with the advent of magnesium in the aircraft manufacturing field, the necessity for hot forming this material made the use of rubber impractical because it smoked and smudged under the heat.

After considerable investigation by Martin's research personnel, a .027 in. spun glass blanket was found to offer extremely favorable prospects.

Effectiveness of the glass cloth blanket in this application results from:

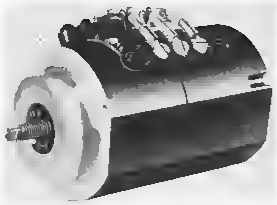
- Its heat resistance.
- Very high tensile strength when drawn tight.
- The hard smooth surface which the glass blanket fibers present to both form block and sheet metal, thus promoting a sliding action between them.
- An accompanying passivity of the glass cloth which permits it to elongate partially with the sheet metal during the stretching operation because of natural flexibility.
- Practicability of stretch forming heated sheet metal over an unheated form block, since the glass blanket acts as a heat resistant insulator, retarding transfer and loss of heat from material to form block.

Use of the glass cloth at Martin indicates that it facilitates production, eliminates operations, and produces more satisfactory parts.

A comparative time analysis of glass cloth vs graphite as a friction reducing agent in stretch forming of a magnesium sheet 125×48×.72 in. shows that eight operations are required for the graphite method, six for glass cloth.

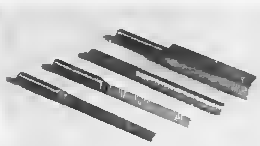
Time required was 70.1 min. for the graphite procedure as against 4.9 min. for the glass cloth method.

NEW AVIATION PRODUCTS



Synchronizes Engines

Synchronous differential, serving as intermediary regulating device for engine control equipment, is announced by **Kollsman Instrument Div**, Square D Co., 80 08 45 Ave, Elmhurst, N Y Single frame houses 28-oz unit (3-45/64 in long, 2⅜ in dia) comprising two synchronous motors and mechanical differential Each motor reflects operating speed of engine and activates ¼-in threaded output shaft rotating at half the difference of two motors' speeds When speeds are equalized output shaft becomes stationary Efficiency and smooth operation are claimed through use of hysteresis motors While motors do not require external excitation, it's stated they yield greater running torque than other self-synchronous types

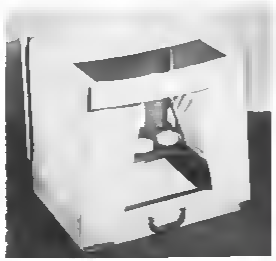


For Filing Operations

Ground carbide die-machine files, offered for altering or correcting dies (as hard as Rockwell 63C) without risks involved in annealing and rehardening, are made by **Severance Tool Industries Inc**, 648 Iowa St, Saginaw, Mich In addition to die-making, product is stated as suitable for parts finishing, templets, and production pieces Claimed is when used for production parts, output may be greatly increased Available are four standard shapes round, square, rectangular, and triangular Produced chiefly for use on die-filing machines, units may be used manually or in any reciprocating device

Die-Metal

New aluminum bronze alloy, Ampco Grade 24, for use in forming and drawing dies where surface material must be free from scratches or where galling would cause inadequate die life, is announced by **Ampco Metal, Inc**, Milwaukee 4, Wisc Alloy is cast to specified patterns by sand or centrifugal methods, to provide die blanks that are reasonably close to size, thus eliminating much preliminary machining

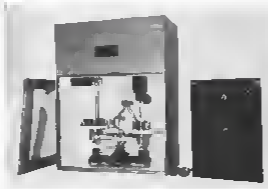


Portable Photo-Developer

Photocopying and developing unit, Copy-Roll Kit," with complete processing facilities and self-contained dark room compactly arranged in portable case, is offered by **Fairchild Aerial Surveys, Inc**, 53 West Union St., Pasadena, Calif Unit is claimed quickly to reproduce written, typed, printed, drawn, or photographed material Developing is by sponge application Material to be copied may be black or colored, single- or double-sided, loose or bound, transparent or opaque Exposure unit weighs less than 2 lb, fits into average size brief case or desk drawer, and may be used for copying without kit

New Face for Ring

Chrome-faced piston rings available from **Wilkening Mfg Co**, Phila., Pa, feature anti-friction and lubricant-retaining characteristics and reduction of cylinder wear Ring, constructed of special alloy, centrifugally cast, and heat-treated to produce dense, uniform structure with high tensile strength for top-groove service, is said to be safe from breakage under heavy loads, because material is not subject to hydrogen-embrittlement



Gages Liquid Flow

Intended for measurement of fuel flow to internal combustion engines, automatic liquid balance, made by **Engineering Research & Development Co.**, P O Box 166, Hinsdale, Ill, is also adaptable to automatic flow determination of any liquid by weight Unit measures time required for given quantity of liquid to flow, as determined by balancing against calibrated weight, hence gaging is independent of physical properties and temperature of fluid Weighing section is installed in 24 × 18 × 9 in cabinet with removable glass door Remote control is in flush-mounted metal box Device may be equipped with electric stop clock or counter

Removes Deposits

Applicable to aircraft overhaul activities is nonflammable, noncorrosive, cold tank material for removal of carbon, sludge, grease and paint Maker is **Turco Products**, 6135 So Central Ave, Los Angeles, Calif Material comprises two layers floating chemical seal and lower layer of cleaning agents

Plier Set

Small plier set No. 14, designed for ignition, starter, generator, carburetor and instrument work, is available from **Bonney Forge & Tool Works**, Allentown, Pa Set comprises three pliers: flat nose, short chainnose, and diagonal cutting unit Tools, each 4 in. long, come in leatherette kit

FINANCIAL

MARKET ACTION

Leading Aircraft Equities

Company	1948 High	1947 Low	July 9 1948 Close	July 9, 1948 % Increase From 1947 Low	July 9, 1948 % Decline From 1946 High
Beech	31	6	12	100	62
Bell	36	11	17	54	53
Boeing	35	14	26	86	26
Convair	34	11	10	—10	71
Curtiss Wright	12	4	8	100	33
Curtiss Wright "A"	34	13	27	108	21
Douglas	109	45	58	29	51
Fairchild E.	8	4	5	25	37
Grumman	26*	9*	25	178	4
Lockheed	45	11	23	109	49
Martin	46	14	18	29	61
Nat American	17	7	12	72	29
Northrop	15	5	12	140	20
Republic	25	4	11	175	44
United Aircraft	34	17	30	77	19

Notes: All fractions omitted
* Adjusted for stock dividend

Aircraft Stocks on Upward Path

As aftermath of new military orders, most equities are above last year's lows, but still under 1946 highs.

While aircraft equities have made substantial price gains from their 1947 lows, the group as a whole has some distance to travel to reach the postwar peaks established during 1946

This market change is merely a reflection of the shifting fortunes of the aircraft industry and the continuing processes of attempting to discount the future Sustained by strong financial conditions built by war orders, representative aircraft equities continued to sell at relatively high levels after the war

As backlogs diminished and resources in many instances were dissipated through commercial ventures, a great deflation took place in the market prices of aircraft shares With considerable uncertainty as to the future of the industry, the postwar lows of aircraft shares, as a rule, were made shortly after midyear in 1947

▶ **New Life**—Then came the President's Air Policy Commission report, followed early this year by the Congressional Aviation Policy Board's recommendations As international conditions deteriorated, greater impetus was given to increased aircraft appropriations Renewed life once again was in evidence for the aircraft builders All this is revealed in the market action of aircraft shares

The accompanying table discloses the market fluctuations of the leading aircraft equities It can be seen that recent prices show substantial recoveries, ranging from 25 to 178 percent from last year's lows At the same time, the group as a whole averages about 40 percent below the postwar peaks attained in 1946

▶ **Shifting Leadership** — The startling feature in the aircraft market action is the high degree of selectivity present Here again, this is nothing more than a reflection of shifting leadership in the industry

Grumman is by far the pacemaker in the current move Up some 178 percent from last year's low, Grumman's common stock is close to its all-time peak recorded during 1946 This is after proper adjustment for the 100 percent stock dividend declared recently Many observers believe that the main reason this equity declined last year was in sympathy with the general weakness which hit all aircraft shares Once the inherently stronger position of Grumman became more apparent, recovery was swift in coming

Another new leader which has rapidly forged to the front is Northrop While up about 140 percent from its low, the equity is but 20 percent away from the 1946 peak Northrop has a record as a very successful aircraft builder The heavy deficit of last year and resultant market weakness are attributed to a non-aviation venture embarked upon by a former management of the company

▶ **Convair Record**—The most amazing showing belongs to Convair The shares of this company remain below the market level of last year and are about 71 percent away from the best prices of 1946 While the Atlas Corp management has been in control for about nine months, it has been unable to bring Convair around to better days

Much of the company's difficulties stem from the expensive development of the Convair-Liner which is primarily responsible for the huge deficit reported last year and probably for most of the losses to be sustained during the current fiscal year This commercial development was undertaken by a previous management

In retrospect, it appears that the timing of the sale of this group's controlling interest in Convair to the Atlas Corp was both fortunate and profitable The new management has inherited the problems of Convair with little likelihood of immediate profit In the aircraft procurement awards recently, the company did not obtain a single order

Only if military procurement continues on a high level in the years ahead, can Convair hope to participate in new awards In this event, it may again become a profitable property

▶ **Class of Gains**—All the large percentage gains were not made by low-priced shares This is shown by the movements of the common and Class "A" equities of Curtiss-Wright Corp

▶ **Changes Since War**—An examination of the respective price movements of aircraft shares discloses the fundamental change in industry positions during recent years The leaders during the war were not the ones in the fore of the postwar parade and still others may yet emerge from the current move

The aircraft industry, along with the airline group, affords outstanding opportunities for profitable investment shifts For example, Martin and Lockheed sold at about the same level during the 1946 peaks with Martin maintaining an advantage at the lows during 1947 However in the ensuing recovery, Lockheed gained 109 percent while Martin could retrace but 29 percent Yet, there were three other equities, Grumman, Northrop and Republic, which surpassed Lockheed in price gains on the recovery move

The fact remains that no two equities have maintained the same relative price movements on both the decline and subsequent recovery This merely substantiates the belief that all future movements will continue to be along selective lines with no assurance that today's leaders will set the pace tomorrow

—**Selig Altschul**

Paris Letter:

French Feeble in Berlin Air Test

Reasons discussed in heated Assembly debate that results in industry changes; Air France affected.

By Boyd France

PARIS—Allied planes thundered into Berlin one a minute last week bringing food and fuel to 2,000,000 people clutched in the Red Army stranglehold.

About once an hour a battered Junker 52 sporting the French tricolor on its tail waddled in for a landing. The French Army had been able to put into the air only six Junkers and one Dakota in the Western bid to hold Berlin. French ships flew 24 hour schedules; together scored an average of 20 landings per day. Combined U. S. and British sorties passed the 400 mark daily.

▶ **Industry Ill**—These feeble flutterings reflected the sickness of the French aircraft industry today. French Army airmen were embarrassed by their poor showing explained that their air fleet was busy in Indo-china and North Africa.

But deputies to the French National Assembly heard another story. A Government investigator told them that three years of nationalization had ridden S.N.E.C.M.A., the state firm which makes 80 percent of French airplane engines, $10 million into the red. He said most of the engines turned out for the French Army wouldn't run, that a whole consignment shipped to Poland was sent back as useless.

▶ **Communists Blamed**—The Government blamed the mess squarely on the Communists, who ran the Air Ministry and S.N.F.C.M.A. for nearly two years after the war. Communist deputies angrily accused their successors of having snarled up S.N.E.C.M.A.—the Government of trying to scrap nationalized industries on orders from Washington. Government spokesmen then hinted broadly that Communist administrators had done a lot of grafting as well as bungling while they controlled the firm.

The debate raged for four days in the Assembly, occassionally flaring up into slugging matches between Communist deputies and majority members. The Government came out of the tussle with a new law designed to overhaul S.N.E.C.M.A. thoroughly.

▶ **New Boss**—The law gave the firm a new boss with sweeping powers to fire personnel, standardize production, and adjust prices and contracts. It also authorized the Government to underwrite about one third of the firm's debts and to give it an immediate $6,000,000 capital transfusion. This transfusion came just in time to save the firm's life, since it has been having trouble meeting its payrolls for the last month.

But the law dodged the main issue. It didn't attempt to answer the question of whether or not nationalization itself might be at the bottom of S.N.E.C.M.A.'s difficulties. A half dozen conservative deputies asked the question, pointed out that the company had consistently showed a prewar profit. The Government brushed them off with the promise that S.N.E.C.M.A.'s books would be re-examined at the end of a year; its definitive organization studied.

▶ **Hopeful Trend**—Odds seemed pretty good that eventually at least part of S.N.E.C.M.A.'s shares would be sold to private investors. The Government had unloaded 30 percent of its Air France stock to private investors, chambers of commerce, and municipal corporations a few days earlier. This seemed to point a hopeful trend to enemies of nationalization.

Partial de-nationalization of Air France apparently was done as a safeguard against possible future bureaucratic mismanagement rather than a criticism of present performance. But the airline still is running a 17 percent deficit; isn't counting on breaking even before the end of 1949. Air France directors say two things are keeping them in the red.

1) Obsolete planes, particularly Junker 52's which are uneconomical to operate.

2) The drain put on dollar resources by purchases of spare parts for U. S.-made planes and by big bills for necessary maintenance and overhauling in the U. S. of American built planes.

▶ **Equipment**—Directors think they have both these problems practically licked. They say that of the 31 Junker 52's still in service, 22 will be replaced with more modern planes in 1948. They expect delivery this year of three Constellation 749s, four C-54s, 16 Languedocs, 10 DC-3s, three de Havilland Dommis, one Latecoere 631 flying boat. This would bring the total strength of their fleet up to 13 Constellations, 15 DC-4s, four C-54s 38 Languedocs, 45 DC-3s, nine Junker 52s, three de Havilland Dommis, three Latecoeres, and three Catalinas.

A series of heavy maintenance workshops being completed is expected to lighten the maintenance bill in the U. S. Spare parts, however, probably will continue to eat up over 40 percent of the airline's annual credits for new equipment.

The shortage of manpower which slowed down expansion in the period immediately following the war also has been overcome. Air France's training school at Le Bourget here turned out 151 pilots, 71 radiomen, 215 mechanics last year, is expected to graduate an even bigger class in 1948. Air France officials now foresee a surplus of trained French personnel developing in the near future.

Cut-Rate Fare Squabble

BOMBAY—An attempt to undercut passenger fares between India and Europe resulted in the detention of a Belgian Sabena Skymaster here for two days before the matter was straightened out.

The Sabena plane, returning from Australia, had been booked on a charter basis by Indian Overseas Airlines to carry 49 passengers to London from Bombay. The fare was to be $300 compared with the $516 charged by Air-India International and other scheduled operators.

Air-India International officials lodged a complaint with the Directorate of Civil Aviation claiming: (a) that regulations prohibited nonscheduled operations over routes awarded scheduled operators, and (b) that the fares violated IATA agreements.

After two days Indian Overseas officials posted the difference in fares with the government, pending settlement of the question, and the plane was allowed to proceed.

New Air Links for Italy

MILAN—Societa Italiana Servizi Aerei's Bagdad-Trieste service connecting with French and Spanish air transport systems establishes a close link between the West and East.

Although the run parallels TWA's routes through Italy to the Levantine ports, it represents a decided advantage for Italian air travelers—they'll be able to pay for their trip with Italian currency.

In addition to the East-West network, SISA's newly established twice-weekly Trieste-Marseille service together with its regular Prague-Milan route links Central and South Eastern Europe on one side, and the Western Mediterranean on the other.

British Permits

Charter operators get ministry approval for scheduled service.

LONDON—A shift in British aviation policy has put a dozen transport companies, formerly air charter operators, into scheduled service with government approval.

Since the war, the Civil Aviation Act had prevented such companies from establishing scheduled operations with any such regularity as might lay them open to the charge of offering common carrier service. Monopoly of all scheduled services within the British Isles was reserved to the nationalized corporation, British European Airways, just as BOAC was given a monopoly of all the scheduled international services.

Now, however, a number of British private operators have been granted permission by the Ministry of Civil Aviation to establish regular services between points within the United Kingdom over routes not now being served by BEA. (Some of the points previously were served by BEA or its predecessors.)

The move came after representations by the British Air Charter Association to the Ministry. In each case, the operator worked out with BEA the type and frequency of services, fares to be charged, etc. After BEA had approved these, the tenders were forwarded to the Ministry for its consent.

▶ **Strictly Business**—The private operators will run their respective services strictly as private business ventures, they alone will stand to make money or lose it on their operations. BEA will neither underwrite the deficits nor share in the profits.

Operations, of course, must conform to all the same MCA and Air Registration Board standards that BEA observes.

The operators and routes to be served are as follows (*indicates route previously served by BEA):

1) Western Airways, Weston-super-Mare—Weston-Cardiff*.

2) Cambrian Air Services, Cardiff—Cardiff-Weston*.

3) Olley Air Services, Croydon—Croydon-Newmarket and Croydon-Cowes (Isle of Wight).

4) British Air Transport, Croydon—Croydon-Cowes (I. of W.).

5) Air Enterprises, Croydon-Croydon-Cowes (Somerton Airport) and Southampton-Cowes.

6) Patrick Duval Aviation, Birmingham—Birmingham-Isle of Man, Birmingham-Liverpool, and Birmingham-Southampton.

7) Lancashire Aircraft Corporation, London—Leeds (Yeadon Airport)—Isle of Man.

8) Northern Air Services, Newcastle—Newcastle-Isle of Man*.

9) Scottish Aviation, Prestwick—Prestwick-Blackpool, and Carlisle-Isle of Man*.

10) Manx Air Charters, Isle of Man—Isle of Man-Carlisle*.

11) Carlisle Air Navigation and Training—Carlisle-Isle of Man*.

12) West Cumberland Air Services—Carlisle-Isle of Man*.

(Note: Because of the number of competitors also granted permission to operate between Carlisle and the Isle of Man, West Cumberland Air Services may not take advantage of its permit.)

The permits are good for six months.

▶ **"Muddling Through"**—Commenting on the new arrangements, "The Aeroplane" describes them as a first-class example of British "muddling through." They are not believed to be either a device for obtaining comparative revenue figures with which to check the efficiency of BEA or a means of proving that such services could not possibly pay their way.

For example, while BEA paid landing fees at the rate of £15 a day for six services on the Weston-Cardiff route, Western Airways and Cambrian Air Services will be paying only £3/12/-d. a day for the same number of services under a new system of fees which came into effect on May 1. Further, the new operators are reported as intending to put up the fares, increasing them from the 9/-d. one way and 16/-d. round-trip charged by BEA to 14/6d. and 22/6d. respectively. Hence, if the independent operators can make this service pay, there will be no basis of comparison with BEA's efforts.

It is understood, however, that while the permits are granted for only six months, the intention is to continue the permission and not merely to fatten up during the critical inaugural period a number of private operators who would then be offered the choice of going out of business or being absorbed by BEA.

BREDA-ZAPPATA 308—ENGINES AND ALL

Societa Italiana Ernesto Breda finally has completed its prototype of the four-engine transport, the BZ-308, started in 1946 (Aviation Week, June 21). Outfitted with four British Bristol Centaurus powerplants, the plane is a low-wing structure, with tricycle landing gear and large-volume fuselage. Various versions of the plane considered were 55, 64, 74, and 80 passenger models, combination passenger and freight transports, and a sleeper comprising twelve berths and 37 chairs. Plane has overall length of 110 ft., with 138 ft. span. Cruising speed is 261 mph., maximum speed 348 mph. Gross weight is 46 tons.

Grass Roots Get New Voice

Air Coordinating Committee panel, plus broadened industry group, recognizes operators' interests.

By Alexander McSurely

New voices for civilian grass roots aviation are provided in the establishment of a state and local government advisory panel to the federal Air Coordinating Committee and in the enlargement of the industry advisory panel of the same policy-making body.

For the first time such organizations as Aeronautical Training Society, Air Freight Association, Aircraft Owners and Pilots Association, National Aviation Trades Association, and the aviation education section of the National Education Association, will be included on the industry advisory panel. This panel has been confined to representatives of Air Transport Association, Aircraft Industries Association, Institute of the Aeronautical Sciences, National Aeronautic Association, AFL and CIO.

▶**New Panel**—Seven organizations have been invited to send representatives for the state-local advisory panel. They are Airport Operators Council, American Association of Airport Executives, American Municipal Association, Council of State Governments, National Association of County Officials, National Association of State Aviation Officials, and U. S. Conference of Mayors.

Establishment of the state-local panel and enlargement of the industry panel—together with the presently functioning CAA Nonscheduled Flying Advisory Committee—will give aviation small business and local government probably the loudest voice they have ever had in the making of federal aviation policy decisions.

Heretofore many federal aviation policy decisions have failed to take into account the smaller aviation interests, and have been based almost exclusively on the interests of the major airlines and heavy airframe industry.

Recognition by the top federal aviation policy-making group of the smaller aviation groups is traced back to repeated vociferous demands for representation of their viewpoints.

▶**Credit NASAO**—National Association of State Aviation Officials and its president, Clarence F. Cornish, Indiana state aeronautics director, can take a good deal of credit for the creation of the state-local panel.

NASAO made strong representations both to the President's Air Policy Commission and the Congressional Air Policy Board that local and state governments should have more voice in federal aviation policy decisions which affected them.

The Finletter commission passed the recommendation by, but the Congressional group reported:

"Advisory panels should be created by the ACC as needed in order adequately to perform its functions. The statute establishing the ACC should require it to make provisions to act as a sounding board for state and municipal agencies on aviation matters touching upon the interests of political subdivisions. This can be accomplished by the creation of an ACC state-local aviation panel which would be attached to the ACC and organized along the lines of the ACC industry advisory panel. The ACC should be directed to refer for recommendation aviation matters affecting industry to the industry panel and aviation matters affecting state and local governments to the state-local aviation panel.

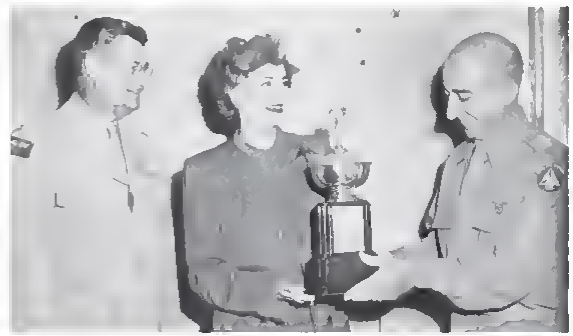
"A state-local aviation panel to advise the Committee is believed the most satisfactory method of giving state and local governments opportunity to express their views and recommendations concerning national aviation policies that directly affect them. Since the ACC is an interdepartmental coordinating body it is not believed proper that the states' representatives be voting members. An essential lack in the present formulation of national aviation policies is permanent liaison with state and local governments."

The Congressional report was directly in line with NASAO recommendations and even used some of the same wording.

▶**Sign of Stature**—Recognition of the small aviation business interests in the aviation industry panel of ACC is likewise a result of the growing influence of such interests in the total aviation picture. Possibly the impressive showing which these interests made recently on Capitol Hill in the GI flight training controversy had some bearing on the broadening of the panel.

It may be interpreted as a hopeful sign that federal officials are slowly beginning to see the importance of aviation training and fixed base operations as a necessary foundation without which neither military nor transport aviation could long continue to progress.

It will be of major benefit to grass-roots aviation that its representatives will have a chance to make their weight felt during the policy-making stage in-



DOBBINS GETS AIRMARKING AWARD

Major General Lucas Beau, Civil Air Patrol commander, looks on as Blanche Noyes (center) awards her airmarking trophy to Col. Jesse L. Dobbins, Atlanta wing commander of the Georgia CAP. Dobbins was responsible for the installation of 61 airmarkers during 1947. Trophy is annual award for the individual most effective in increasing the number of standard air markers and who receives no pay. Trophy is donated by Blanche Noyes, chief of the CAA airmarking section.

stead of after a definite policy has been formulated. It is much better to prevent a damaging policy from being formed, or to alter it to one consistent with small aviation's interest during the formulative stage than to wait until it is settled and then attack it.

Smaller civil aviation businesses and state and local governments will watch with new interest the policies developed by ACC, as the new advisory panel and the enlarged industry panel go into action. Dates for their first meetings in Washington will be set soon.

States Regulating Air Crop-Dusting

State regulations on crop spraying and dusting from airplanes are being considered in a number of states as a result of the rapid growth of the agricultural use of airplanes in the postwar period.

Michigan, Minnesota and several other states are reported developing through their state aeronautics commissions revised regulations covering airplane spraying and dusting—which rapidly is becoming one of the most profitable non-transport branches of aviation.

▶**Problems**—Two problems of regulation are of major importance for air crop-dusting.

One involves the low flying required for this work, and the regulations which may need to be waived in order to permit this.

The other relates to the types of chemicals used in the aerial bombardment of crop insect pests and weeds. Wartime chemical developments converted to agricultural uses have brought with them new difficulties, including toxic effects on surrounding plant and animal life.

Trend is seen in several states toward state licensing of the crop-spraying and dusting business, with pilots required to demonstrate a certain knowledge of the chemicals used. In addition, certain restrictions on use of the chemicals would be set up.

University Uses for Plane

University of Illinois airplane travel service, making use of the 31 airplanes owned by the University's Institute of Aeronautics, has flown more than 128,000 miles in the six months since the service was started. It has been of service to some 36 departments of the university.

Sample of the travel is a trip recently made by a professor who was taken to Chicago early one morning to catch a commercial airliner to New York for a three hour conference. He returned the same afternoon, was picked up by the university plane at Chicago, and was back on the campus at 7 p. m. the same day.

Average flying time of trips is three hours. One trip carried the whole survey staff of the College of Education to Springfield, Mo., in 2 hr. 55 min., against a comparable rail time of 10 hr. 55 min. and two changes of trains. The service is operated by the Institute of Aeronautics.

The Extension Division has carried teachers on weekly trips to classes at Princeton and Sterling, Ill., and candidates for vacancies in the university staff have been flown to the campus when they had only a brief time in which to make the visit. At least three of the university's new deans made their first visit to the campus by airplane.

Pre-stall Indicators Available on Pipers

Piper Aircraft Corp. has announced completion of arrangements to make Safe Flight pre-stall warning indicators optional equipment on current Piper models including the PA-11 tandem trainer, the PA-14 four-place Family Cruiser and the PA-15 side-by-side Vagabond.

Purchasers can have the indicators installed by Aircraft Accessories Co., Lock Haven, Pa., which makes non-standard instrument installations on new Piper planes as they come off the assembly line.

William T. Piper, president, in announcing the availability of the indicators, said: "I have been favorably impressed with effectiveness of the Safe-Flight indicator in averting stall-spin accidents and feel that widespread use of stall instrumentation will do a great deal to improve the safety record in personal aviation."

Accident Report

Mid-air collision of two Aeronca tandem trainers near Norristville, Pa., at 2000 ft. altitude resulted in deaths of one pilot and passenger on April 4, 1948, CAB accident investigators report.

The other pilot escaped from the collision uninjured.

Pilot Arden C. Meredith, and his passenger, Francis P. Meyers, were practicing spins, stalls and similar maneuvers in the area. Pilot Fred C. Byham was returning from similar practice.

CAB finding showed that Meredith made a sharp pullup from below Byham's plane. Left wing of Meredith's plane struck Byham's right wing, after which Meredith's plane crashed out of control. Byham was able to make a safe emergency landing in a nearby field.

Meredith had commercial, multi-engine and instructor ratings, and 1100 hr. Byham had private pilot and single-engine ratings with approximately 112 hr.

None of the three persons involved wore parachutes. Crash was attributed by CAB to Meredith's failure to avoid the other plane while maneuvering, with Byham's failure to maintain a proper lookout called a contributing factor.

SOUTHWEST ENGINE CLINIC

Audience of 175 executive and military pilots and CAA representatives heard L. H. Clark, Pratt & Whitney Aircraft service school representative lecturing at the recent customers' engine clinic at Southwest Airmotive Company, Dallas, a P&W distributor. During the two days 55 executive aircraft were parked at SAC, and visitors came from 13 states and two South American countries. They represented owners of 15 different executive aircraft types.

Boyd Elected to Head S.E. Airport Managers

Henry Boyd, Wilmington, N. C., was elected president of the Southeastern Airport Managers Association at the recent meeting in Spartanburg, S. C. Boyd is manager of Bluethenthal Field, Wilmington, and succeeds O. L. Andrews, Greenville, as president of the association.

Other officers elected include Robert Lamotte, Savannah, vice president, and J. H. Manning, manager of Augusta Airport, re-elected secretary-treasurer.

Prof. L. J. Nachtrab of Atlanta, chairman, Division of Aeronautical Administration, University of Georgia, told the airport managers that standard business principles must be applied to operations in order to insure profitable business.

"Almost since its inception," he said, "the airport has been regarded as a novelty which may be likened to a side show in a carnival. The operators have depended upon this novelty to attract business. This will not work any longer."

Hangar Fire Losses Low

Flash fire resulting from a newly welded and still hot structural member on a Piper Cub coming in contact with alcohol-based brake fluid under the floor boards of the plane resulted in a recent hangar fire at Atwood Airport, Northampton, Mass. Damage was set at approximately $10,000.

Credit for saving three other airplanes usually kept in the same hangar is given to the airport management, which has a regular practice to remove aircraft in hangar before doing any maintenance work in the same area. Prompt arrival of the fire department controlled the fire which had spread to the hangar roof planking and saved the hangar.

Air Circuses Under Fire

New Jersey's State Aviation Commission is clamping down on air circuses and stunt flying.

In an announcement made last week, the Commission stated that it was going to take disciplinary action against aerial acrobats and that it "has determined as a result of continuing studies that the risk of accompanying the so-called air show and the detrimental publicity that generally follows such shows far outweighs any benefit that might be derived from such projects. It has also been determined that too many accidents and much promiscuous, irresponsible flying can be traced to the type of flight generally participated in and associated with the show."

BRIEFING FOR DEALERS & DISTRIBUTORS

BACK TO TOP PRE-WAR LEVEL?—At the rate personal aircraft have been shipped during the first six months of 1948, the lightplane industry has about dropped back to its biggest pre-war level of production. In 1941 CAA estimated personal aircraft shipments of planes of 165 hp. or less at 7420. If the rate of plane shipments for the first six months of 1948 continues for the remainder of the year, the total will be slightly below 8000. Lightplane shipments for the first six months were 3866 personal planes plus 101 Aeronca L-16 liaison planes of essentially the same type, totalling 3967.

Looking at the much larger production figures of 1946 and 1947 with hindsight, it appears that the 34,522 shipments in 1946 and the 15,262 shipments in 1947, were filling up an abnormal demand created by lack of production during the war years.

Viewing the current market picture realistically, it seems likely that an 8000 total for 1948 may be a levelling off point from which the industry may move on to better things in 1949.

BONANZA MASS FLIGHT—Five Beech Bonanza four-placers left Oakland Calif., Municipal Airport early in July for a formation vacation flight to Alaska. Each plane carried a passenger in addition to the pilot and hunting and fishing gear. After takeoff from Chico, Calif., home of most of the group, they reached Edmonton, Canada 6 hr. 30 min. later. They had a one-day weather delay and then flew to Fairbanks, arriving 16 flying hrs. later. The flight was in formation with occasional fuel stops. Great Circle distances from Oakland to Edmonton to Fairbanks total nearly 3,000 mi.

NEWSPAPER AVIATION COVERAGE—Bill Anderson, Pennsylvania Aeronautics Director, has issued a bulletin to airport owners and operators in his state urging them to seek local newspaper cooperation in more complete aviation coverage. Among concrete suggestions is the old but always effective practice of free flight training to local newspaper reporters who cover aviation subjects to build up their factual background on aviation and to form the basis for a series of articles on first hand experiences in learning to fly.

Bulletin suggests the formation of an aviation page as a weekly feature of the local newspaper. It points out that this can often be done by grouping aviation stories which would be used anyway, into one page without using more space and yet providing a definite departmentalization which will create more readers for the material in that page.

Accompanying the bulletin is a tear sheet of the Johnstown (Pa.) Tribune weekly aviation page as a specimen of constructive aviation news coverage which resulted from "educating" Mrs. Mary Hobar, Tribune reporter, in such a free flight course at Johnstown Municipal Airport.

FIGHTING FROST WITH PLANES—A squadron of seven low-flying airplanes recently saved 3500 acres of budding wheat in Camas County, Idaho from frost damage, in an early morning emergency flight. Flying at 10 to 50 ft. above the fields, the planes created a downwash that stirred up ground air and raised temperatures from 28 to 31 and 32 degrees. The circulation of air preventing formation of frost was regarded as important as the rise in temperature. Flare pots hung on fences guided the planes which flew with navigation lights until it was light enough to prevent collision.

The Idaho flyers followed techniques recommended by California ranchers, who had also used this method of fighting frost and recommended it as superior to the smokescreen. Camas County's 1947 wheat crop suffered an estimated $1,000,000 frost damage. Of 100,000 acres of wheat in the region, 50,000 were considered in the frost danger area. It is planned to use one plane to fly over each 500 acres, in event of serious frost threat.

$500,000 TETERBORO FIRE—Fifty-eight airplanes recently were destroyed in a fire at Teterboro Air Terminal that also destroyed hangars of Rausch Flying Service and Safair Flying School, with total damage estimated at around $500,000, most of it covered by insurance, according to Fred L. Wehran, president of the terminal. A night watchman said an explosion occurred when he opened the door of a plane to shut off a gasoline leak. Prompt fire department action prevented flames from spreading to other hangars.

—ALEXANDER McSURELY

Costs Pushing Fares Up Again

United files tariff raising passenger rates by one-half cent a mile in what may be prelude to general boost.

The domestic airlines may be losing another bout with inflation.

United Air Lines has set the wheels in motion for what may be the third industry wide 10 percent passenger fare increase of the postwar period. A new tariff boosting UAL's rates from 5.5 to about 6 cents a mile effective Sept. 1 was to be filed with CAB last week.

▶**Other Carriers Mum**—The move brought no immediate reaction from other carriers, although sentiment for the fare hike has been developing. Even before United's announcement, Northwest Airlines President Croil Hunter had indicated his company would seek an increase this fall.

W. A. Patterson, UAL president, said the new fare boost was made necessary when increased efficiency failed to offset the effect of steadily rising costs. "We expect this fare increase to help," he declared, "but whether it is sufficient will depend on future cost trends and readjustments in mail pay which United feels are essential."

Basic one way domestic airline fares today are six percent lower than in 1941 despite the continued inflation, Patterson pointed out. "In contrast, one way Pullman fares were approximately 17 percent higher than prewar levels even prior to the Interstate Commerce Commission's recent action granting an other passenger rate increase averaging 17 percent to eastern railroads. And the general retail price level has risen to 177 percent of 1941."

▶**Traffic Slump a Factor**—Like most other carriers, United's need for more revenue stemmed in part from the passenger traffic slump during the first five months of this year. In June, for the first time in 1948, UAL's revenue passenger mileage was above that of the same month last year, showing a gain of over 14 percent.

United's move toward higher fares followed closely upon a CAB warning that it would not use mail pay to compensate a carrier for all the increased costs arising from the current inflation spiral. In its Chicago & Southern Air Lines rate opinion (AVIATION WEEK, July 19), the Board said "further increases in passenger and cargo rates may well be required if rising price and wage levels continue to be reflected in increased unit cost of revenue traffic."

▶**Three Boosts for NWA**—Northwest Airlines, while favoring the new fare boost, was in a more difficult position than other carriers with regard to leading the movement. It has instituted three hikes since March, 1947, against two for the remainder of the industry.

Last October, NWA made effective the first second-round passenger fare hike. Then, on Mar. 15 of this year, it lifted rates another eight percent.

Effect of Northwest's third-round hike was tempered by its 10 percent round trip discount and the plan for rebating five percent of the ticket price to passengers on planes arriving at their destinations over 30 minutes late (AVIATION WEEK, Feb. 16). Early this month NWA indicated to CAB it could not seek higher passenger fares until other carriers had met its current tariff level.

Failure of other carriers to follow United immediately in seeking higher fares presents a parallel with the situation last fall. Northwest took the lead at that time, making its increase effective in October. But the remainder of the industry was slow to follow suit, American not falling in line until December, and Eastern and National delaying action until January.

NWA "On-Time" Program

Northwest Airlines' "on time" program is paying off. Since its inception last March, 90.9 percent of all flights have been ahead of the 30-min. deadline, Croil Hunter, NWA president, recently announced. This is all part of the airline's cash-backed intention to keep its flights on schedule. A 5 percent refund is made to any passenger whose arrival is delayed more than 30 min.

PAN AM STRATOCRUISER

Pan American World Airways new Clipper America, first of an order of 20 Boeing Stratocruisers to be delivered in November, is shown in flight. The Clipper America will cut the San Francisco-Honolulu flight time to eight and one-half hours and New York-London flight time to twelve hours. Craft carries 75 passengers and has a lounge and bar on the lower of its two decks.

Use of Flight Engineers Protested

American leads battle against ruling, claiming third crew member on DC-6 may be safety hazard.

The airlines still are battling the new Civil Air Regulations which require use of a flight engineer—in addition to the pilot and copilot—on DC-6s, Boeing Stratocruisers and other aircraft certificated for more than 80,000 lb takeoff weight.

American Airlines, operator of the largest fleet of DC-6s (50), is leading the fight on the rules announced by CAB in April (AVIATION WEEK, Apr 26) to take effect Dec 1. In a petition for relief, AA asserted flatly that injection of a flight engineer would constitute a definite hazard to safety.

▶ **Accident Records Cited**—"Our conviction in this regard," American declared, "is borne out by the history and design of the DC-6 cockpit, by the absence of any duties which could be delegated to an engineer, and by the accident record of four-engine aircraft with and without engineers."

AA maintains there should be no blanket Civil Air Regulation requiring employment of an engineer on aircraft in excess of 80,000 lb., or any other specific weight. Besides being illogical, the carrier continued, such regulations will restrict unduly the initiative of manufacturers and carriers in their attempts to design airplane cockpits of ever increasing simplicity. "They would end forever the progressive evolution of the simplified two man cockpit . . . one of the main safety factors of the DC-6."

▶ **Research Required**—American said that questions of crew complement are technical problems which should be decided only after scientific research by manufacturers, carriers and the Civil Aeronautics Administrator.

The petition stated that American is concerned over the absence of basic scientific information and research with respect to two of the main problems of air transport safety: (1) simplification of cockpit design, and (2) coordination between pilot and copilot, or between the members of a multiple crew.

▶ **Investigation Urged**—"We believe CAB should conduct a thorough investigation, in conjunction with the Civil Aeronautics Administrator, the Air Force, the Navy and certain private organizations, into all such problems." AA declared. "Pending the results of such an investigation, it should not take the dangerous step of injecting a third crew member into a two-man cockpit such as that of the DC-6."

Asserting "there is nothing whatever for a flight engineer to do in a DC-6," American explained with charts and statistics why operation of the plane with the extra crewman is a hazard. It emphasized that the DC-6 cockpit is essentially the most recent DC-4 cockpit with the addition of newly developed means of easing the pilots' load, adding that with such a setup a flight engineer could only "get in the way."

▶ **Functions Listed**—AA said historically the flight engineer has performed one or more of the following functions:

• Repair and servicing of planes on the ground at isolated or inadequately manned stations—"This was the function of wartime flight engineers or crew chiefs. Plainly there is no need for such a man in American's DC-6 operation, where qualified ground crew provide necessary service at each station."

• Repairs in flight—"Some few aircraft, such as the Boeing 314 flying boats, were built to permit access to engines in flight. In an airplane so constructed, the flight engineer has possible usefulness. The DC-6 is not such an airplane."

• Fuel conservation—"This has been the principal function of flight engineers employed in long-haul or over-ocean operations. The joint efforts of airlines and aircraft, engine and instrument manufacturers have created significant simplifications in fuel conservation: automatic carburetion, torque meters for direct reading of engine power, fuel flow meters, etc. With this evolution of direct and more simple techniques, the importance of the flight engineers with his 'howgozit' curve is fast disappearing even on transocean routes."

• Engine power control—"In some aircraft, by reason of design concept or construction, it is impossible to locate the required controls and instruments within visual and manual range of the pilots. In such cases, it becomes necessary that certain related instruments and controls, frequently those affecting the control of engine power, be segregated and removed to another panel which then necessarily becomes the station for another crew member. The DC-6 is not such a plane. In conception, construction and certification it is a two-man aircraft."

▶ **Safety Threat Seen**—American said that actuarial experience with heavy planes shows that a flight engineer does not add to safety. "Actually the opposite is true. There have been roughly twice as many accidents involving fatalities per unit of four-engine plane miles flown with flight engineers as without them.

"Some accidents can be traced directly to flight engineer error as a major or contributing cause, whereas no accident has been traced to the absence of a flight engineer. No DC-6 accident has been traced to the absence of a flight engineer or to an excessive work load on the pilots."

SAFETY COUNCIL AWARD

Mid-Continent Airlines President J. W. Miller (right) is shown accepting the National Safety Council's 1947 Aviation Award from Albert H. Wood (center), retiring head of the Kansas City Safety Council, who made the presentation in behalf of Ned H. Dearborn, president of the National Safety Council. The plaque cites Mid-Continent for flying 282,622,000 passenger miles in 13 years without a passenger or crew fatality. Leon W. Crowl (left) was elected to succeed Wood.

Helicopter Mail Sees Economy Ax

Chicago service postponed for further study. Los Angeles may revert to trucks in PO economy drive.

Extension of helicopter airmail service to additional U. S. metropolitan areas may be blocked by the Post Office Department's economy program.

After warmly endorsing helicopter mail operations in the Chicago area for more than 18 months, the Post Office has suddenly turned cautious. It has asked the Civil Aeronautics Board to postpone further proceedings in the Chicago helicopter service case pending additional studies to determine whether the new operation is really needed.

▶**Quick Switch** — Shortly before, the Post Office had urged acceptance of a CAB examiner's report recommending that Helicopter Air Service, Inc., be granted a five-year temporary certificate to carry mail and property over three circular routes and a shuttle link radiating out of Chicago Municipal Airport (AVIATION WEEK, May 17). Army and Navy officials also have strongly backed helicopter airmail operations for the assistance they will give to development of the helicopter generally and to creation of a reserve of trained flight and maintenance personnel.

The Post Office still contends its enthusiasm for helicopter airmail services has not cooled. But last December, the Department asked CAB to postpone indefinitely a scheduled prehearing conference in the New York area helicopter case "pending new studies." After eight months, the postponed prehearing conference still has not been rescheduled.

AVIATION WEEK reported late last year that the Post Office apparently had gone "bearish" on helicopter mail operations. The statement was disputed by high Post Office Department officials.

▶**Tests Ordered**—Meanwhile, the Post Office is making periodic tests to determine whether a substitute surface transportation system in the Los Angeles area can be established at less cost to the government while providing essentially the same service as Los Angeles Airways. LAA began its certificated helicopter mail operations last October, 1947.

Results of the recent Los Angeles area tests with mail trucks "are not conclusive, and no final decision can yet be reached on them," according to Post Office officials. They added, however, that preliminary findings showed truck routes perform the job more economically.

▶**O'Connell Comments** — During oral argument, CAB Chairman Joseph J. O'Connell, Jr., observed it is generally understood that surface transport is cheaper than helicopter service. He said reopening the record in the Chicago helicopter service case merely to confirm this fact did not seem warranted.

Post Office officials also pointed out that the full effect on air transportation of the recently enacted air parcel post bill cannot yet be measured. "It is conceivable," they said, "that the volume of airmail together with air parcel post may increase to such an extent that the helicopter contemplated by the applicants (in the Chicago service case) will not have sufficient capacity. Use of other equipment will necessarily alter materially the cost estimates for the service."

Helicopter Air Service, Inc., which was recommended for the Chicago routes, plans to use Bell 47Bs if certificated. Los Angeles Airways presently operates with the larger Sikorsky S-51s.

▶**LAA Record**—With the aid of a recent mail rate increase to $1.50 a plane mile, Los Angeles Airways has been running well in the black thus far this year. But costs are considerably higher than estimated in the carrier's application for a certificate.

Trafficwise, LAA's operations have been continually on the upgrade. Mail ton miles flown rose from 646 last October to 1235 in December and 2460 in May. The helicopter operator's April mail volume exceeded that handled by five of the ten active feederlines in the same period.

All Canadian Mail by Air

Canada is leading the way toward making full utilization of its airmail services.

The Dominion this month began carrying by plane all letters which do not weigh over an ounce, bear a 4-cent stamp, and can obtain expedited delivery through use of air service. The Canadian Postmaster General stated that through negotiations with Trans-Canada Air Lines and feeder carriers, the "all up" service will be operated on an experimental basis to ascertain whether it can be maintained at a reasonable cost and with the desired degree of efficiency.

NEW MAINTENANCE DOCK

An all-wood maintenance dock, providing close accessibility and nominal cost, is being operated by the 530th Air Transport Group at Fairfield-Suisun AFB, Calif. Built in two sections, the dock has an overhead covering when used outdoors to provide additional protection from weather. Engines, wings and front part of the fuselage can be reached from waist level.

CAB Broadens Attack on Nonskeds

More operators are added to list of nonskeds accused of violating the nonscheduled exemption.

The Civil Aeronautics Board is stepping up its campaign against alleged violators of its nonscheduled exemption.

Two operators on the U. S.-Alaska route are the latest to become entangled in CAB enforcement proceedings. They are Mt. McKinley Airways, Anchorage, Alaska, which has been using two DC-3s, and Golden North Airways, Fairbanks, Alaska, which flies two DC-3s and a C-46. Both carriers were ordered to show cause by Aug. 9 why they should not be forced to cease and desist from violating the Civil Aeronautics Act.

▶**Flights Too Frequent**—CAB enforcement attorneys charged that although Mt. McKinley has authority to operate only as an "irregular" carrier, it had in fact made regular and frequent flights between Seattle and Anchorage. The company's U. S.-Alaska trips reportedly numbered between seven and twelve monthly from October, 1947, through March, 1948.

Golden North was cited for operating frequent and regular trips primarily between Seattle and Fairbanks. CAB said the irregular carrier made between eight and 15 flights per month from October 1947, through March, 1948.

▶**Tabor Yields Letter**—Meanwhile, enforcement proceedings are continuing against nonscheduled carriers on the transcontinental and Puerto Rican runs. Edward Ware Tabor, president of Trans-Atlantic Airways, New York, early this month surrendered his letter of registration as an irregular operator.

Trans-Atlantic, whose letter of registration was suspended about two months ago for alleged "willful and knowing" violations of the Civil Aeronautics Act (AVIATION WEEK, June 7), had been offering $99 coast-to-coast fares. Tabor reportedly will remain active in the nonscheduled and contract field as president of Sky Coach, Ltd., a New York reservations and booking agency. (AVIATION WEEK, May 24).

Two certificated transcontinental carriers—American and United—have asked to intervene in CAB's case against Standard Air Lines, Long Beach, Calif., which was cited for alleged violation of the nonscheduled exemption on the coast-to-coast run at the same time as Trans-Atlantic. Standard, which is contesting the Board's allegations, has denied that either American or United has a legitimate interest in the proceeding and has asked CAB to exclude them.

▶**Puerto Rican Service**—Two enforcement proceedings are pending against uncertificated carriers operating between the U. S. and Puerto Rico. American Air Transport and Flight Schools, Inc., Miami Springs, Fla., was ordered to show cause by July 30 why it shouldn't be ordered to cease and desist from violating the Civil Aeronautics Act. The company, which has two DC-3s, allegedly operated with too great a frequency and regularity between New York, Miami and San Juan and at times failed to charge the fares specified in its tariffs.

Continental Charters, Inc., Miami, has denied CAB charges that it violated the Civil Aeronautics Act by operating with excessive frequency and regularity between Miami and San Juan and by failing to file tariffs. The company indicated it had been flying its two DC-3s under charter to a travel agency. It suggested that if CAB had a complaint, it should properly proceed against the agency, not the carrier.

Seaboard & Western Shows $11,209 Profit

Seaboard & Western Airlines, Inc., which has made a profit since it started flying, had an earned income, before taxes, of $11,209 for the seven-month period ending Mar. 31, 1948.

Its report to the Civil Aeronautics Board, filed last week under new CAB regulations affecting irregular air carriers, stated that at the end of its first fiscal year Aug. 31, 1947, earned income was $10,034 before taxes.

▶**No Airmail Pay**—President Raymond A. Norden, emphasizing that the earnings were achieved without benefit of airmail pay, said his company had flown 2,620,885 freight ton miles since it started flying operations at the close of May, 1947, through May, 1948.

In its peak month last February, Seaboard flew 421,739 freight ton miles. Thirty-seven of the 153 shipments on eastbound flights exceeded 1000 lb. each and of those 20 were between 1000 and 2000 lb., and three exceeded 10,000 lb. Average shipment was 855 lb.

Development of international air freight, he said, points to an "enormous potential."

▶**Eight-Month Preparation**—Organized in 1946, Seaboard spent its first eight months pioneering routes to Europe and the Middle East, negotiating for landing rights, and selecting and training flight crews. Flying began with one DC-4, converted for all-freight operation. Four have been added.

Norden reported that during the carrier's first operational year its craft completed 224 flights over the North Atlantic and logged more than 6200 flying hours.

▶**Varied Cargo**—Shipments of wearing apparel constituted 44 percent of the total business, though cargo varied widely. The company has carried some passengers on a contractual basis.

Designated one of the commercial airlines supporting the Military Air Transport Service airlift to Berlin, Seaboard flew four of the nine flights in the first lift around July 1 and was named to do six of the 15 set up by the Air Force last week to carry 100 engines for the operation. Others in the latest announcement are Transocean Airlines four, Alaska Airlines, four, and Pan American Airways, one.

Arizona to Begin Service

Arizona Airways, Phoenix, plans to inaugurate service on its newly-certificated feeder system early in August with two DC-3 roundtrips daily between Phoenix, Prescott, Flagstaff and Winslow, Ariz. Two weeks after starting service, Arizona Airways hopes to extend operations to other points.

SEARCHLIGHT SECTION

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SHORTLINES

▶**Air France**—Performed 98.5 percent of its scheduled flights during the first six months of 1948, and 91 percent of the trips were flown without major delay. Of the delays, 24 percent were due to weather, 55 percent to technical reasons, and 21 percent to ground handling problems.

▶**American Overseas**—On July 14 inaugurated the first postwar airmail service inside Germany. Under an agreement with German postal authorities, AOA is operating 25 roundtrips weekly between Frankfurt and Russian blockaded Berlin.

▶**Capital**—Airfreight volume increased from 909,672 ton miles and 4,337,173 lb. in the first six months last year to 2,050,352 ton miles and 8,265,420 lb. in the first half of 1948. . . . Company's certificate issued to Pennsylvania Central Airlines Corp. has been reissued by CAB in the new name, Capital Airlines, Inc.

▶**Chicago & Southern**—CAB has closed its investigation into company finances, routes and operations which was instituted in March, 1947. The possibilities disclosed by the probe for additional economy or efficiency in management or operations will be dealt with by the Board in pending mail rate cases. . . . C&S has received CAB permission to use airports at Montego Bay, Jamaica; Kingston, Jamaica; Aruba, N.W.I.; Curacao, N.W.I.; and Caracas, Venezuela, in opening its new link to South America.

▶**Colonial**—Passenger revenues during the first half of 1948 exceeded those of the same 1947 period by nearly $28,000 and totaled $1,031,869.

▶**Flying Tiger Line**—Reports flying over 6,000,000 freight ton miles in the first half of 1948, a 400 percent gain over the same period last year. Robert W. Prescott, president, said his company was exceeding its forecast of 1948 business by about 20 percent.

▶**Northeast**—Has been authorized by CAB to suspend service for one year at Moncton, New Brunswick, Canada, terminal point on Route 27-F. NEA told the Board that load factors over the Bangor, Me.-Moncton segment are currently averaging only 15 percent and that the operation is unnecessary since more direct and less expensive service between Canada's maritime provinces and Boston is offered by Trans-Canada Air Lines.

▶**Pan American**—Has signed an arbitration agreement with its CIO navigators, thus averting a strike called for July 21. . . . San Francisco-Shanghai service has been increased from two to three flights weekly and San Francisco-Hong Kong flights from three to five weekly.

▶**Scandinavian Airlines System**—Was slated to make its first flight from New York International (Idlewild) Airport late last week.

▶**Slick**—Flew 13,539,714 freight ton miles in the first half of 1948, up 38 percent over the same period last year.

▶**TWA**—Airline Communication Employes Association (CIO) has taken a strike vote among 600 radio and teletype operators. Company has accepted an arbitration plan proposed by the National Mediation Board to settle the dispute. . . . CAB has granted authorization for TWA to serve Johnstown, Pa., on AM 2 for one year.

▶**United**—Increased its cargo capacity from the New York area by 30 percent this month by placing additional cargo DC-4s on its transcontinental route. . . . Harold Stassen, Thomas E. Dewey and Henry Wallace covered more than 45,000 miles in Chartered UAL planes during pre-convention tours.

▶**Western**—On Aug. 1 will reduce freight rates an average of 25 percent on 19 major commodities carried between California points and Portland and Seattle-Tacoma. . . . May airfreight volume was up 48 percent over the same month last year.

▶**Wisconsin Central**—Planned to double service on its entire system this month. Revenue passenger miles increased from 55,000 in March to 103,017 in April, 149,940 in May and 185,655 in June. Company is still operating in red but losses declined from about $30,000 in March to $13,000 in April, $7000 in May and less than $5,000 in June.

CAB SCHEDULE

July 26—Hearing on Pacific certificate amendment case of Pan American Airways and Northwest Airlines. (Docket 2952, et al.)

July 27—Hearing on National Airlines route consolidation case. (Docket 2967.)

July 28—Hearing on foreign air carrier permit application of Servicos Aereos Cruzeiro do Sol. (Docket 3338.)

July 29—Oral argument on complaints by Air Line Pilots Association and International Association of Machinists against National Airlines. (Dockets 3283 and 3298.)

Aug. 5—Hearing on reopened TWA-Delta equipment interchange agreement case. (Docket 2346.)

Aug. 30—Hearing on Capital Airlines mail rate case. (Docket 434.)

Sept. 13—Hearing on Board's investigation of free and reduced rate transportation. (Docket 2737, et al.)

Oct. 4—Hearing on route consolidation applications of American, Eastern and TWA. (Docket 2581, et al.)

PICTURE CREDITS

CAA—33. McGraw-Hill World News—21. NACA—11. USAF—22, 23, 41. Wide World—13.

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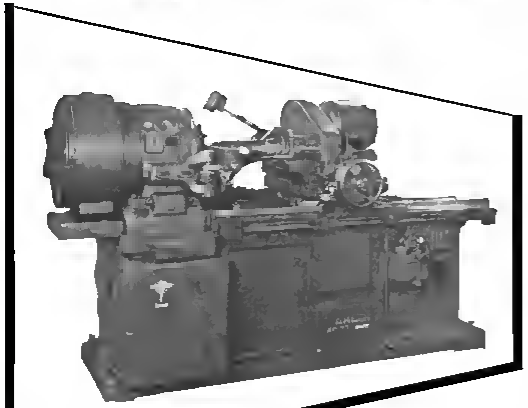

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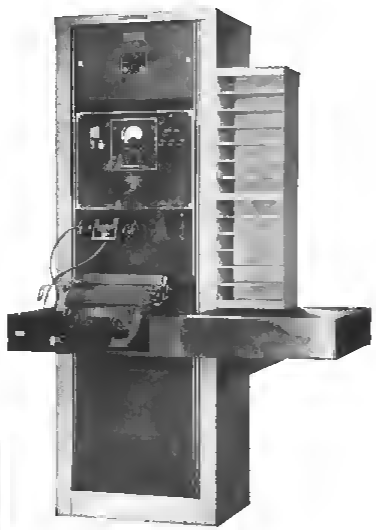

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SEARCHLIGHT SECTION
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EDITORIAL

Two Questions for Personal Plane Makers

In the short period since publication by Harvard University of the book "Personal Aircraft Business at Airports," a spot check among fixed base operators and personal airplane consumers finds many who agree with the diagnosis of Prof. Lynn Bollinger and Arthur Tully, the authors.

They decided that the main trouble with the ailing personal aircraft business was the product it had to sell.

They recommended that a design with more utility be offered so that the market would grow. Such a design should be a plane capable of using very small fields, which could be placed economically near centers of population. This would require the airplane to have quietness, plus short takeoff and landing characteristics.

In all fairness, a number of airplanes now on the market have a real utility which is not sufficiently appreciated by anyone except the small and slowly growing group of people who own and use them. Particularly useful are the four-place airplanes of relatively high performance whose cross-country time approaches and in some cases surpasses twin-engine airline time for the same trips.

However, these airplanes have not been designed for the very small close-in landing facilities that Bollinger and Tully talk about. Their landing speed and their take-off run are still in such large figures that only a highly skilled demonstrator pilot could put most of them safely into the "ball-park" sized landing facilities called for.

It would take no design miracle to provide a similar four-placer which could operate out of very small fields—but at sacrifices in cruising speed, power and initial low cost.

Besides the conventional fixed wing airplane with high lift devices for small field performance, there are other possible answers to this problem. Some of the more obvious:

- The helicopter.
- A convertaplane which ascends and descends like a helicopter but levels off for cruising flight like an airplane.
- An aircraft using some form of boundary layer control such as, possibly, the experimental Custer channel wing.

Up until now, the rank-and-file American lightplane company has elected to make an airplane designed to use the existing airport pattern. We know of no airplane being marketed which can use safely and comfortably an airstrip 200 by 600 ft.

Federal technical and safety regulations also are a major factor in any plane manufacturer's decision to make the drastic change in his product that Bollinger and Tully want.

Experience with CAA heretofore has not been such as to encourage the manufacturer to take such a step. However the manufacturers are now studying the definite offer of CAA, made months ago by former Administrator T. P. Wright, to give them much more freedom in certification of aircraft.

Sudden recognition of the responsibility that goes with such freedom has caused the manufacturers to take a second look at the whole matter.

Yet, a serious overhauling of CAA technical regulations governing personal aircraft would be a very important and helpful step in the recommended product change. A definite understanding that slow flying aircraft would get special recognition in safety regulations would be another helpful step.

Theoretically the helicopter has such recognition now. Actually the red tape snarl created in the recent interpretation by CAA in a Washington, D. C., helicopter case has thrown a serious cloud over the whole helicopter operation situation.

If there should be made available a four place personal and business plane with the characteristics described, it would be a relatively inexpensive matter to provide close-in landing facilities in most cities. The lakefront airstrips which are being developed at Chicago, Milwaukee and Cleveland for today's airplanes are far more expensive because of their size than such a miniature airstrip would be.

Besides increased utility, the increased safety factor of a relatively lightly loaded aircraft with slow landing speed and short takeoff merits serious consideration. The Crash Injury Research Organization has made studies pointing to the fact that built in crash protection increases in effectiveness as the speed of the plane drops. This actually is only a reinbstantiation of a basic fact often demonstrated in auto crashes.

Investigations now going on with a slow flying fixed wing airplane at Aeronautical Research, Inc., Boston, indicate that a plane with a maneuverable speed of 40 mph. and crash protection effective at 50 mph. is in sight experimentally.

Admittedly, the first cost of such airplanes would be higher than that of current models. But two obvious questions present themselves:

- Will not consumers be willing to pay a higher cost to get an aircraft with such increased safety and utility?
- Will not the higher consumer demand created by such increased utility and safety result in greater volume of production than today's with attendant lowering of unit costs?

(Editor's Note: In the vacation absence of Robert H. Wood, Editor of Aviation Week, *this editorial has been contributed by Alexander McSurely, associate editor.)*

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